3

SOFTWARE

Tools for Productivity & Creativity

Chapter Topics & Key Questions

3.1 **System Software: The Power behind the Power** What are three components of system software, what does the operating system (OS) do, and what is a user interface?

3.2 **The Operating System: What It Does** What are the principal functions of the operating system?

3.3 **Other System Software: Device Drivers & Utility Programs** What are the characteristics of device drivers and utility programs?

3.4 **Common Features of the User Interface** What are some common features of the graphical software environment (GUI), and how do they relate to the keyboard and the mouse?

3.5 **Common Operating Systems** What are some common desktop, network, and portable (embedded) OSs?

3.6 **Application Software: Getting Started** What are five ways of obtaining application software, tools available to help me learn to use software, three common types of files, and the types of software?

3.7 **Word Processing Software** What can I do with word processing software that I can't do with pencil and paper?

3.8 **Spreadsheet Programs** What can I do with electronic spreadsheet worksheets that I can't do with pencil and paper and a standard calculator?

3.9 **Database Software** What is database software, and what is personal information management software?

3.10 **Specialty Application Software** What are some principal kinds of specialty software?

3.11 **Filenames and File Extensions** What are some common filename extensions, what purpose do they serve, and what is data compression?

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"What we need is a science called **practology,** *a way of thinking about machines that focuses on how things will actually be used."*

So said Alan Robbins, a professor of visual communications, on the subject of *machine interfaces*—the parts of a machine that people actually manipulate.[1] An *interface* is a machine's "control panel," ranging from the volume and tuner knobs on an old radio to all the switches and dials on the flight deck of a jetliner. You may have found that on too many of today's machines—digital watches, cameras, even stoves—the interface is often designed to accommodate the machine or some engineering ideas rather than the people actually using it. Good interfaces are intuitive—that is, based on previous knowledge and experience—like the twin knobs on a 1950s radio, immediately usable by both novices and sophisticates. Bad interfaces, such as a software program with a bewildering array of menus and icons, force us to relearn the required behaviors every time.

So how well are computer hardware and software makers doing at giving us useful, helpful interfaces? The answer is, they're getting better all the time. Improving interfaces is the province of *human-computer interaction (HCI),* which is concerned with the study, design, construction, and implementation of human-centric interactive computer systems. HCI goes beyond improving screens and menus into the realm of adapting interfaces to human reasoning and studying the long-term effects that computer systems have on humans. HCI encompasses the disciplines of information technology, psychology, sociology, anthropology, linguistics, and others. As computers become more pervasive in our culture, HCI designers are increasingly looking for ways to make interfaces easier, safer, and more efficient.

HCI innovations are also extremely important for people with disabilities, including blindness and limited mobility. Google is working on an Android OS add-on that will make the mobile phone operating system much easier for blind people to use. One idea is to disable the touchscreen and add buttons with holes or other manually discernable dintinctions. Another is to develop GPS-based phones for the blind that can read street signs and directions aloud and sophisticated screen-reader software that can turn documents and web pages into synthesized speech. Amazon is now working on new features such as an audible menu system for its e-reader, Kindle.[2]

Note that the 2010 U.S. government standards according to the American Disabilities Act of 1990 require accessibility options for computer hardware and software in various government and public education venues (*www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf*).

In time, as interfaces are refined, computers may become no more difficult to use than a car. Until then, however, for smoother computing you need to know something about how software works. Today people communicate one way, computers another. People speak words and phrases; computers process bits and bytes. For us to communicate with these machines, we need an intermediary, an interpreter. This is the function of software, particularly system software.

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HCI Careers!

Could you make a career in HCI-associated areas? Go to:

www.sigchi.org

www.hfcareers.com/Default.aspx

Do you see some HCI-related areas that you might consider as a major?

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Who Was John Tukey?

The term *software* was coined by John Tukey. Who was he? Did he coin any other important computer terms? Do a keyword search on his name and see what you can find out.

3.1 SYSTEM SOFTWARE: The Power behind the Power

System software is the platform for running application software.

As we mentioned in Chapter 1 (p. 28), *software,* or *programs,* consists of all the electronic instructions that tell the computer how to perform a task. These instructions come from a software developer in a form (such as a CD or DVD,

USB drive, or an Internet download) that will be accepted by the computer. ***Application software*** **is software that has been developed to solve a particular problem for users—to perform useful work on specific tasks or to provide entertainment.** ***System software*** **enables the application software to interact with the computer and helps the computer manage its internal and external resources.** We interact mainly with the application software, which interacts with the system software, which controls the hardware.

New microcomputers are equipped not only with system software but usually also with some application software. There are three basic components of system software that you need to know about. *(● See Panel 3.1.)*

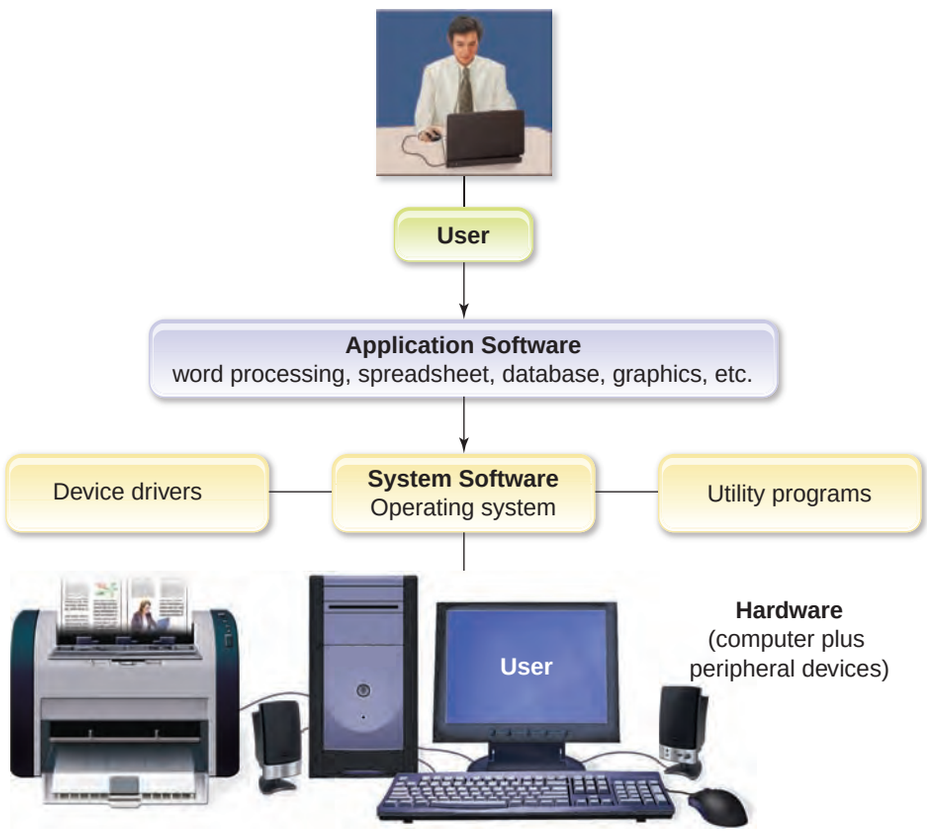
- **Operating systems:** An operating system is the principal component of system software in any computing system.
- **Device drivers:** Device drivers help the computer control peripheral devices.
- **Utility programs:** Utility programs are generally used to support, enhance, or expand existing programs in a computer system.

A fourth type of system software, *language translators*, is briefly described in Chapter 10.

3.2 THE OPERATING SYSTEM: What It Does

The operating system manages the entire computer system.

The *operating system (OS)* consists of the low-level, master system of programs that manage the basic operations of the computer. These programs provide resource management services of many kinds. In particular, they handle the control and use of hardware resources, including disk space, memory, CPU



panel 3.1

Three components of system software

In general, system software is the interface between the user/application software and the computer hardware. (Occasionally users interact directly with the system software—for example, when setting security options, organizing files, and installing and launching application software.)

time allocation, and peripheral devices. Every general-purpose computer must have an operating system to run other programs. The operating system, through its interface, allows you to concentrate on your own tasks or applications rather than on the complexities of managing the computer. Each application program is written to run on top of a particular operating system.

Different sizes and makes of computers have their own operating systems. For example, Cray supercomputers use UNICOS and COS; IBM mainframes use MVS and VM; PCs run Windows or Linux and Apple Macintoshes run the Macintosh OS. Cellphones have their own operating systems, such as Apple's iPhone OS 3 or 4, which works with iPhones, or Google and the Open Handset Alliance's Android operating system for smartphones and other mobile devices. With a few exceptions, an operating system written for one kind of hardware will not be able to run on another kind of machine.

But before we discuss the different kinds of operating systems, we should have an idea of what operating systems do. We consider:

- Booting
- CPU management
- File management
- Task management
- Security management

Booting

When you turn on a computer, you boot it, meaning that the operating system starts to load.

The work of the operating system begins as soon as you turn on, or "boot," the computer. ***Booting*** (from "bootstrapping") **is the process of loading an operating system into a computer's main memory.** This loading is accomplished automatically by programs stored permanently in the computer's electronic circuitry (called *read-only memory*, or *ROM*, described in Chapter 4). When you turn on the machine, programs called *diagnostic routines* test the main memory, the central processing unit, and other parts of the system to make sure they are running properly. Next, BIOS (for "basic input/output system") programs are copied to main memory and help the computer interpret keyboard characters or transmit characters to the display screen or to a disk. Then the boot program obtains the operating system, usually from the hard disk, and loads it into the computer's main memory, where it remains until you turn the computer off. *(● See Panel 3.2.)*

COLD BOOTS & WARM BOOTS When you power up a computer by turning on the power "on" switch, this is called a *cold boot*. If your computer is already on and you restart it, this is called a *warm boot* or a *warm start*.

After installing new software on your computer, you will usually see a "Restart" button displayed; by clicking on this button, you authorize a warm boot and restart the computer, which allows the new software to be recognized by the computer.

THE BOOT DISK Normally, your computer would boot from the hard drive, but if that drive is damaged, you can use a disk called a *boot disk* (or a *restore disk*) to start up your computer. A boot disk is usually a CD or a flash drive (Chapter 4) that contains all the files needed to launch the OS. When you insert the boot disk into your computer's CD drive, you answer the displayed queries to feed the OS files to the BIOS, thereby enabling it to launch the OS and complete the start-up routine. After the OS loads completely, you then can access the contents of the hard drive, run basic drive maintenance utilities, and perform troubleshooting tasks that will help you resolve the problem with the drive.

Survival Tip

New Software & Compatibility

Pay attention to compatibility requirements when you obtain new software. The system requirements for running the software will be listed on the box or included with the downloaded information. When it is time to update the software, you can usually do that by paying a small upgrade fee to the software manufacturer and then downloading the new version and/or obtaining a new CD/DVD.

more info!

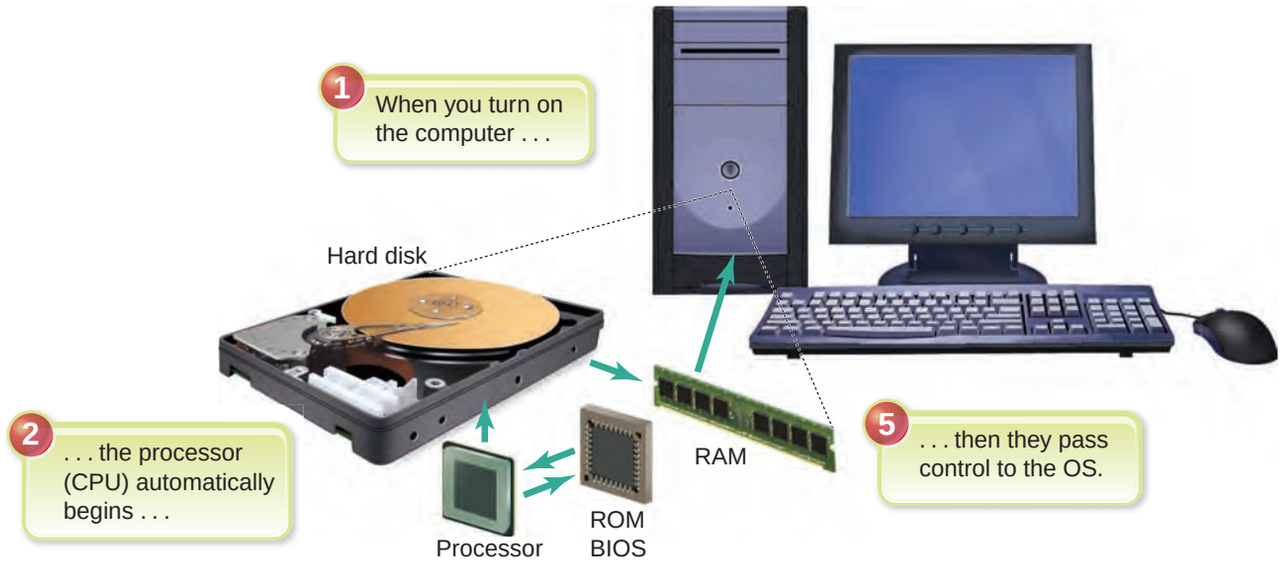
If Windows doesn't boot properly, it may go into Safe Mode. You can also get into Safe Mode by pressing the F8 key during the boot process. Safe Mode is used for diagnosing problems and fixing them. When the system is in Safe Mode, only the essential parts of the system work—monitor, mouse, keyboard—and there are no fancy interface graphics on the screen.

www.computerhope.com/issues/chsafe.htm

http://computer.howstuffworks.com/question575.htm

Once you are in Safe Mode, you use the Device Manager to fix problems:

https://kb.wisc.edu/helpdesk/page.php?id=502

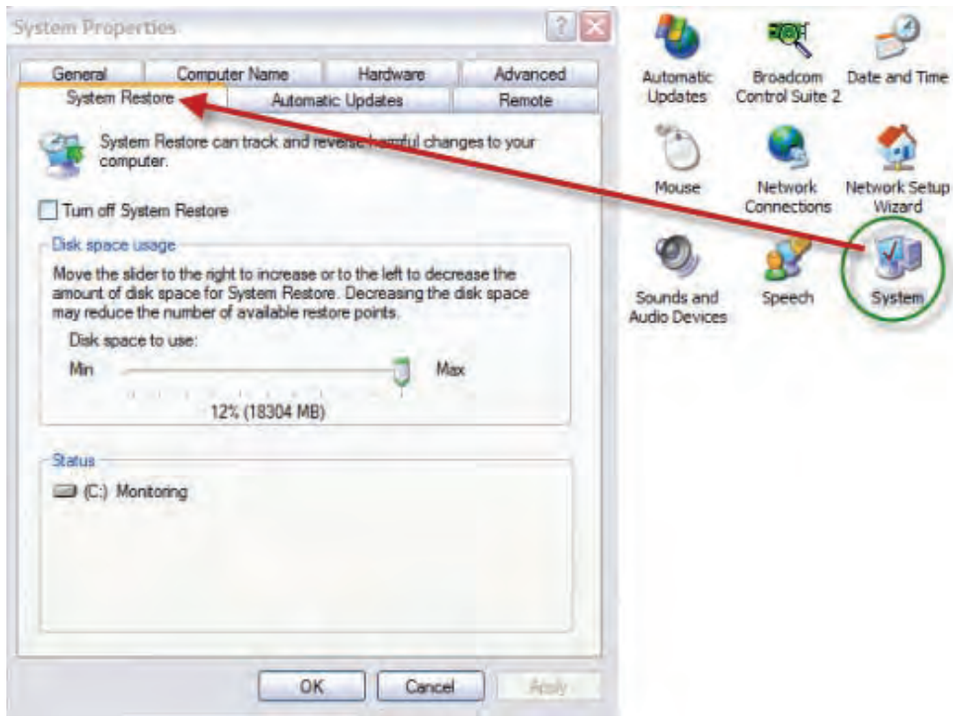

1 When you turn on the computer . . .
Hard disk
2 . . . the processor (CPU) automatically begins . . .
RAM
5 . . . then they pass control to the OS.
Processor
ROM BIOS
3 . . . executing the part of the operating system's start-up system (BIOS) located in ROM.
4 These instructions help load the operating system from the hard disk into RAM (main memory), and . . .

panel 3.2

Booting

What happens when you turn on the computer

If a boot disk did not come with your computer system, then make your own by following the instructions in the online user's manual on your system manufacturer's website (which you can also download to your computer).



more info!

Going Backward

Another way to get out of a system problem is to use System Restore *(left)*, found by clicking on the System icon, via Start, Control Panel. Restore System restores the system files to a previous date and/or time. Your data files (for example, documents) are not affected, and you can customize your System Restore points (dates and times) via the System restore icon. The Mac operating system does not have a built-in system restore function; check your user's manual or go online to get restore instructions.

CPU Management

The CPU is the central processing unit.

The central component of the operating system is the supervisor. Like a police officer directing traffic, the ***supervisor,*** **or *kernel,* manages the CPU** (the central

processing unit or processor, Chapter 1, p. 29). **It remains in memory (main memory or primary storage) while the computer is running and copies into memory other "nonresident" programs (programs that were not in memory) to perform tasks that support application programs.** The supervisor remains in memory until the computer is turned off.

MEMORY MANAGEMENT The operating system also manages memory—it keeps track of the locations within main memory, where the programs and data are stored. It can swap portions of data and programs between main memory and secondary storage, such as your computer's hard disk, as so-called *virtual memory*. This capability allows a computer to hold only the most immediately needed data and programs within main memory. Yet it has ready access to programs and data on the hard disk, thereby greatly expanding memory capacity.

GETTING IN LINE: QUEUES, BUFFERS, & SPOOLING Programs and data that are to be executed or processed wait on disk in *queues* (pronounced "Qs"). A queue is a first-in, first-out sequence of data and/or programs that "wait in line" in a temporary holding place to be processed. The disk area where the programs or documents wait is called a *buffer*. Print jobs are usually *spooled*—that is, placed—into a buffer, where they wait in a queue to be printed. This happens because the computer can send print jobs to the printer faster than the printer can print them, so the jobs must be stored and then passed to the printer at a rate it can handle. Once the CPU has passed a print job to the buffer, it can take on the next processing task. (The term *spooling* dates back to the days when print jobs were reeled, or copied, onto spools of magnetic tape, on which they went to the printer.)

File Management

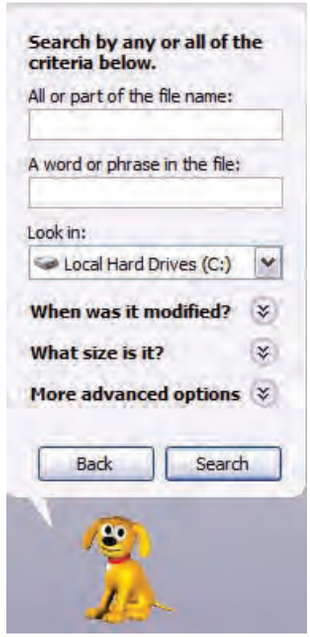
Every operating system or program uses a file management system to organize and keep track of files.

A *file* is (1) a named collection of data (data file) or (2) a program (program file) that exists in a computer's secondary storage, such as a hard disk or CD/DVD. Examples of data files are a word processing document, a spreadsheet, images, songs, and the like. Examples of program files are a word processing program or a spreadsheet program. (We cover files in more detail at the end of the chapter; note that files created by different programs are stored in different file formats, which is why some files will not open in all programs.)

FINDING & HANDLING FILES Files containing programs and data are located in many places on your hard disk and other secondary storage devices. The operating system records the storage location of all files. If you move, rename, or delete a file, the operating system manages such changes and helps you locate and gain access to it. For example, you can *copy*, or duplicate, files and programs from one disk to another. You can *back up*, or make a duplicate copy of, the contents of a disk. You can *erase*, or remove, from a disk any files or programs that are no longer useful. You can *rename*, or give new filenames to, the files on a disk.

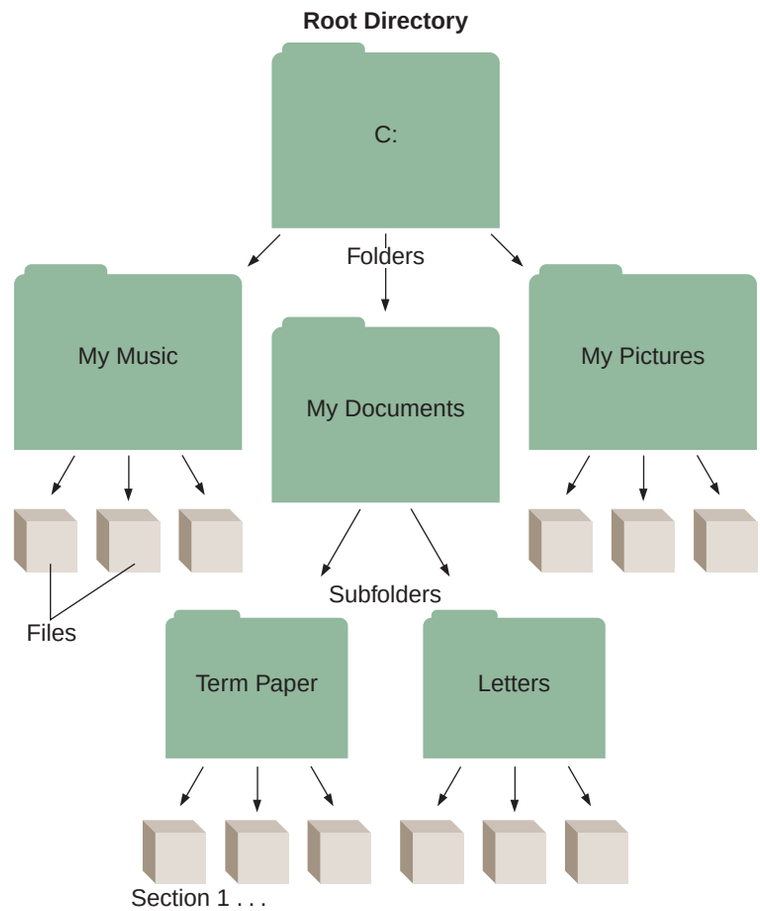
ORGANIZING FILES: DIRECTORIES/FOLDERS, SUBFOLDERS, & PATHS The operating system's file system arranges files in a hierarchical manner, first into folders (also called *directories*) and then into subfolders (subdirectories). *(● See Panel 3.3.)* The topmost folder/directory is called the *root directory;* a folder below another folder is called a *subfolder* (*subdirectory*)*;* any folder above a subfolder is called its *parent folder* (*parent directory*).

To find a particular file in an operating system's file system, you type in the file's *pathname*. The *path* is the route through the file system. A simple example of a pathname in Windows is *C:\mydocuments\termpaper\section1.doc*


Search by any or all of the criteria below.
All or part of the file name:
A word or phrase in the file:
Look in:
Local Hard Drives (C:)
When was it modified?
What size is it?
More advanced options
Back
Search

Windows XP (*left*), Windows 7 (*middle*), and the Mac operating system (*right*) provide a Find (Search) function for finding files if you don't know the pathname.

"C" refers to the hard disk (the root directory); "mydocuments" is the main (or primary) folder, the parent folder to "termpaper," which is a subfolder; "section 1" is the name of the file (filename); and "doc" is a file extension that indicates what type of file it is (.doc = document). (Note that in Unix-based operating systems and the Mac OS X operating system, the pathnames use a forward slash [/] instead of a backward slash [\ ].)



panel 3.3
Directories/folders, and subfolders, and files

Task Management

The operating system is the manager of the tasks that the computer performs.

A computer is required to perform many different tasks at once (multitasking). In word processing, for example, it accepts input data, stores the data on a disk, and prints out a document—seemingly simultaneously. Most desktop and laptop operating systems are single-user systems that can handle more than one program at the same time—word processing, spreadsheet, database searcher. Each program is displayed in a separate window on the screen. Other operating systems (multiuser systems) can accommodate the needs of several different users at the same time. All these examples illustrate *task management*. A *task* is an operation such as storing, printing, or calculating.

MULTITASKING: HANDLING MORE THAN ONE PROGRAM CONCURRENTLY

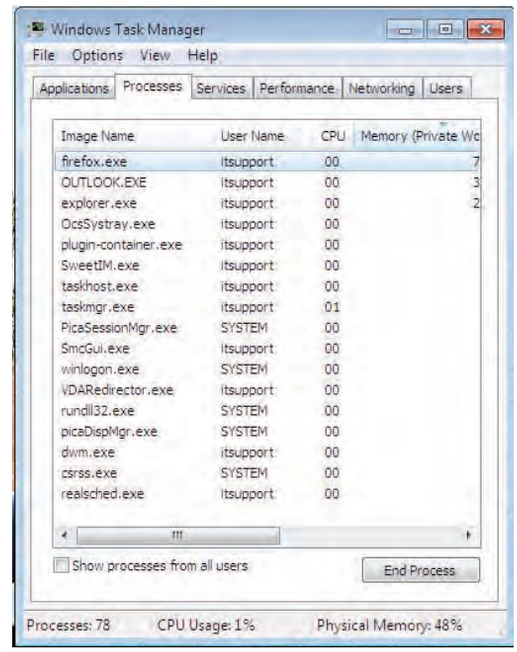
Multitasking **is the execution of two or more programs by one user almost at the same time on the same computer with one or two central processors**; that is, the programs are sharing the same processing resources. You may be writing a report on your computer with one program while another program

more info!

Task Manager

If you want to see a list of processes being executed by your system, open the Task Manager *(right)* in Windows by holding down the Ctrl, Alt, and Del keys.

plays a music CD. How does the computer handle both programs at once? The answer is that the operating system directs the processor(s) to spend a predetermined amount of time executing the instructions for each program, one at a time. Thus, a small part of the first program is processed, and then a processor moves to the remaining programs, one at a time, processing small parts of each. The cycle is repeated until processing is complete. Because the processors are usually very fast, it may appear that all the programs are being executed at the same time. However, the processors are still executing only one instruction at a time.



Security Management

Operating systems also take care of some security management.

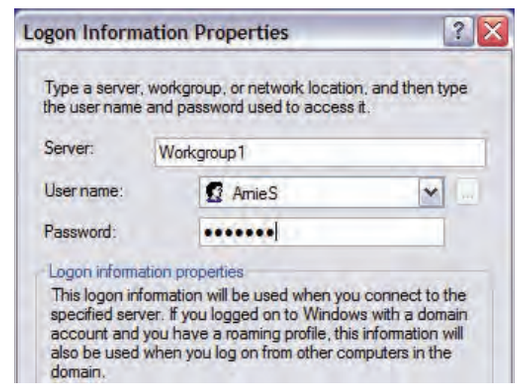
Operating systems allow users to control access to their computers—an especially important matter when several people share a computer or the same computer network. Users gain access in the same manner as accessing their email—via a user name (user ID) and a password. As we stated in Chapter 2, a *password* is a special word, code, or symbol required to access a computer system. When you first boot up a new personal computer, the OS will prompt you to choose a user name and a password. Then, every time after that, when you boot up your computer, you will be prompted to type in your user name and password. Some OSs even allow you to protect individual files with separate access passwords. (The Help feature explains how to change or turn off your password.)

Computer systems and security issues have become complicated

Survival Tip

Is Your Password Guessable?

Don't choose a password that could be easily guessed. Examples of weak passwords are birth date, anniversary date, boyfriend/girlfriend name, city/town name, pet's name, fad words/expressions, or names of celebrities or famous movie/book characters. Instead, use meaningless letters and numbers. The longer the password, the better—and don't use the same password for everything that requires passwords.


Logon Information Properties
Type a server, workgroup, or network location, and then type the user name and password used to access it.
Server: Workgroup1
User name: AmieS
Password: •••••••
Logon information properties
This logon information will be used when you connect to the specified server. If you logged on to Windows with a domain account and you have a roaming profile, this information will also be used when you log on from other computers in the domain.

The password is usually displayed as asterisks or dots, so that anyone looking over your shoulder—a "shoulder surfer"—cannot read it.

In Windows, you can access the Security Center (*left*) via the Control Panel to control additional security features (*right*).

and critically important. We discuss this subject in more detail in Chapters 6, 8, and 9.

3.3 OTHER SYSTEM SOFTWARE: Device Drivers & Utility Programs

Drivers and utility programs add functionality to your computer and help it perform better.

We said that the three principal parts of system software are the operating system, device drivers, and utility programs. Let's now consider the last two.

Device Drivers: Running Peripheral Hardware

Device drivers communicate with peripherals (usually input/output devices).

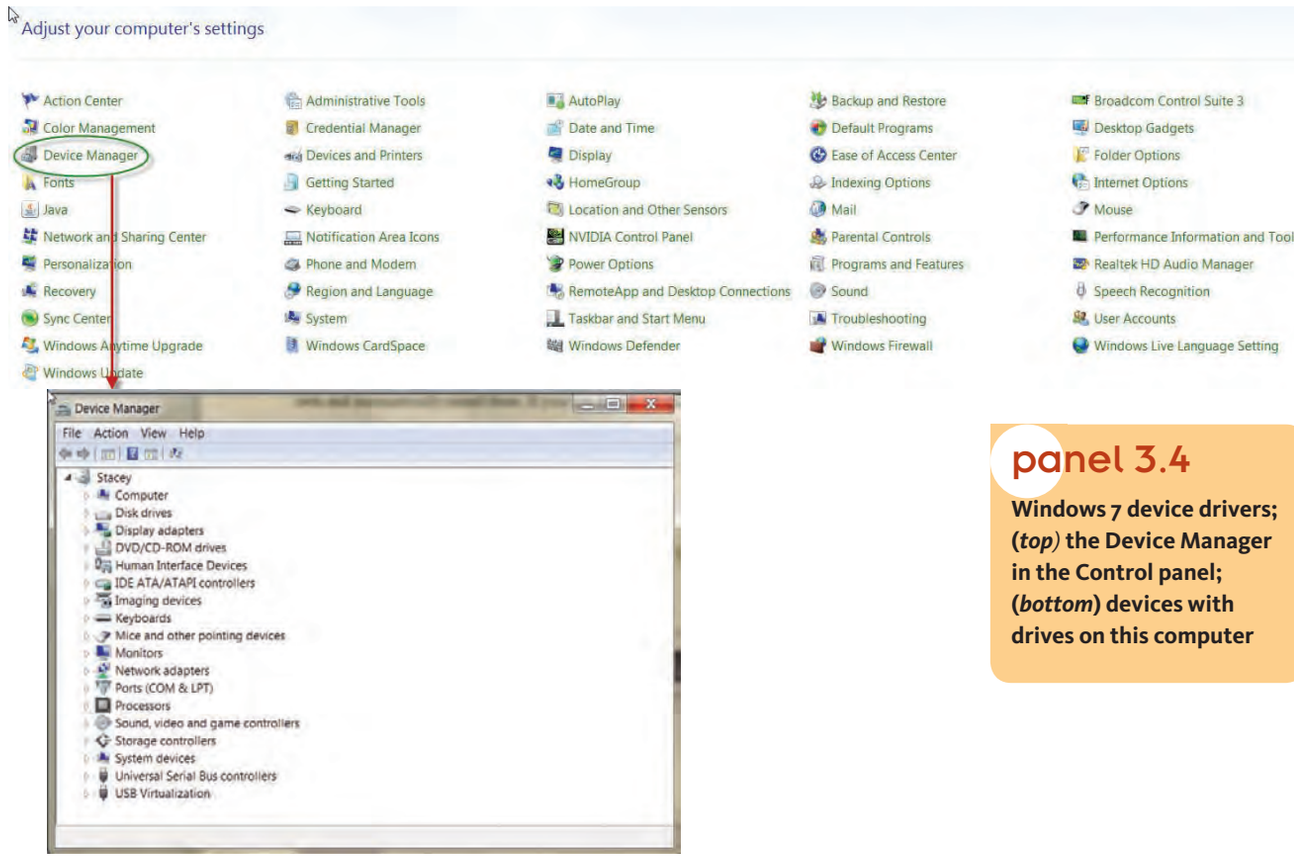
Device drivers **are specialized software programs that allow input and output devices to communicate with the rest of the computer system.** Each device's brand and model are supported by a different driver that works with only one operating system. Many basic device drivers come with the system software when you buy a computer, and the system software will guide you through choosing and installing the necessary drivers. If, however, you buy a new peripheral device, such as a mouse, a scanner, or a printer, the package will include a device driver for the device (probably on a CD or DVD, or downloaded from the Internet).

Most new operating systems recognize many new hardware devices on their own and automatically install them. If your OS does not recognize your new hardware, it will display a message and ask you to install the driver from the CD that came with your hardware. *(● See Panel 3.4.)*

Survival Tip

Update Your Drivers

You should regularly (once a year, say) update your drivers. To do so, visit the websites of your peripheral devices' manufacturers and download any updates. You can also buy utilities for backing up and restoring drivers, such as 3D2F.com Software Directory (*http://3d2f.com/programs/54-281-my-drivers-download.shtml*) or Driver-Soft.com's Driver Genius *(www.driver-soft.com)*.



panel 3.4

Windows 7 device drivers; (*top*) the Device Manager in the Control panel; (*bottom*) devices with drives on this computer

PRACTICAL ACTION

Utility Programs

Utility programs are incorporated into the operating system. Others, such as antivirus programs, are sold as standalone programs. Some important utility programs are as follows:

Backup

Suddenly your hard-disk drive fails, and you have no more programs or files. Fortunately, we hope, you have used a *backup utility* to make a backup, or duplicate copy, of the information on your hard disk. The backup can be made to an external hard drive, an off-site networked (online, or "cloud") site, or other choices discussed later in the book. Examples of freestanding backup utilities are Norton Ghost (from Symantec) and DT Utilities PC Backup.

Data Recovery

One day in the 1970s, so the story goes, programming legend Peter Norton was working at his computer and accidentally deleted an important file. This was, and is, a common enough error. However, instead of reentering all the information, Norton decided to write a computer program to recover the lost data. He called the program "The Norton Utilities." Ultimately it and other utilities made him very rich.

A *data-recovery utility* is used to restore data that has been physically damaged, deleted, or corrupted. Data can be damaged by viruses (see following), bad software, hardware failure, and power fluctuations that occur while data is being written/recorded.

Virus Protection

If there's anything that can make your heart sink faster than the sudden failure of your hard disk, it may be the realization that your computer system has been invaded by a virus. A *virus* consists of hidden programming instructions that are buried within an application or system program. Sometimes viruses copy themselves to other programs, causing havoc. Sometimes the virus is merely a simple prank that pops up in a message. Other times, however, it can destroy programs and data and wipe your hard disk clean. Viruses are spread when people exchange CDs and flash drives, download information from the Internet and other computer networks, or open files attached to email. *(• See Panel 3.5, p. 130.)*

You should, therefore, install antivirus software. *Antivirus software* is a utility program that scans all disks and memory to detect viruses. Some utilities destroy the virus on the spot. Others notify you of possible viral behavior. Because new viruses are constantly being created, you need the type of antivirus software that can constantly update itself against newly discovered viruses. Examples of antivirus software are Symantec's Norton AntiVirus, Webroot Antivirus, and McAfee AntiVirus. New viruses appear every day, so it's advisable to look for an antivirus utility that offers frequent online updates without additional cost.

We discuss viruses again in more detail in Chapter 6.

Data Compression

As you continue to store files on your hard disk, it may eventually fill up. You then have several choices: You can delete old files to make room for the new. You can add a second hard-disk drive, externally or internally. Or you can use a data compression utility, such as PK Zip, ZipIt, WinZip, or StuffIt. (As a result of the name "Zip," people have come to refer to compressing a file as "zipping" and decompressing a file as "unzipping.") ("Zip" programs are often included with an OS.)

Data compression utilities remove redundant elements, gaps, and unnecessary data from computer files so that less space (fewer bits) is required to store or transmit data. (Also see the end of the chapter.) With a data compression utility, files can be made more compact for storage on your hard-disk drive. With the increasing use of large graphic, sound, and video files, data compression is necessary both to reduce the storage space required and to reduce the time required to transmit such large files over a network.

As the use of sophisticated multimedia becomes common, compression and decompression are being increasingly taken over by built-in hardware boards that specialize in this process. That will leave the main processor free to work on other things, and compression/decompression software utilities will become obsolete.

File Defragmentation

Over time, as you delete old files from your hard disk and add new ones, something happens: the files become fragmented. *Fragmentation* is the scattering of portions of files about the disk in nonadjacent areas, thus greatly slowing access to the files.

When a hard disk is new, the operating system puts files on the disk contiguously (next to one another).

more info!

More on Utilities

For some unusual utilities, go to:

NimiVisuals
www.mynimi.net

Piriform
www.piriform.com/defraggler

FileAlyzer
www.safer-networking.org/en/filealyzer

Edgeless
www.fxc.btinternet.co.uk/assistive.htm

Fences
www.stardock.com/products/fences

PCWorld
www.pcworld.com/downloads/file/fid,114526-order,4/description.html

File Guru
www.fileguru.com/DetectSatan/info

FreeOTFE
www.freeotfe.org

DoubleKiller
www.bigbangenterprises.de/en/doublekiller

JPEGsnoop
www.impulseadventure.com/photo/jpeg-snoop.html

Top Ten Reviews
http://pc-system-utilities-software-review.toptenreviews.com/

more info!

PC Tune-Up: Stop at the Pitstop

To find out what problems your PC has and to learn which utilities might improve its performance, go to:

www.pcpitstop.com/default.asp

and try their free computer scans.

However, as you update a file over time, new data for that file is distributed to unused spaces. These spaces may not be contiguous to the older data in that file. It takes the operating system longer to read these fragmented files. A *defragmenter* utility program, commonly called a "defragger," will find all the scattered files on your hard disk and reorganize them as contiguous files. Defragmenting the disk will speed up the drive's operation. So, if you notice your computer slowing down, it might be a good idea to "defrag" the disk. Computer users who use their machines for hours every day might want to defrag every few days.

Disk Scanner (ScanDisk or Check Disk) & Disk Cleanup

These utilities detect and correct certain types of common problems on hard drives and CDs and search for and remove unnecessary files, such as temporary files, or "temp files." Both Windows and the applications you run create temp files needed only for short tasks and system restore (return to normal operating conditions) after certain types of system problems. These files are stored in the Temp folder. For example, when you create a Word document, Word stores a temp file version of it in the Temp folder. When you save this document, Word saves it to the location you designated and then deletes the temp file. The computer should delete temp files when a program is closed, but this doesn't always happen. Also, files will be left in the Temp folder if the computer crashes. Thus temp files can accumulate in the Temp folder and take up space.

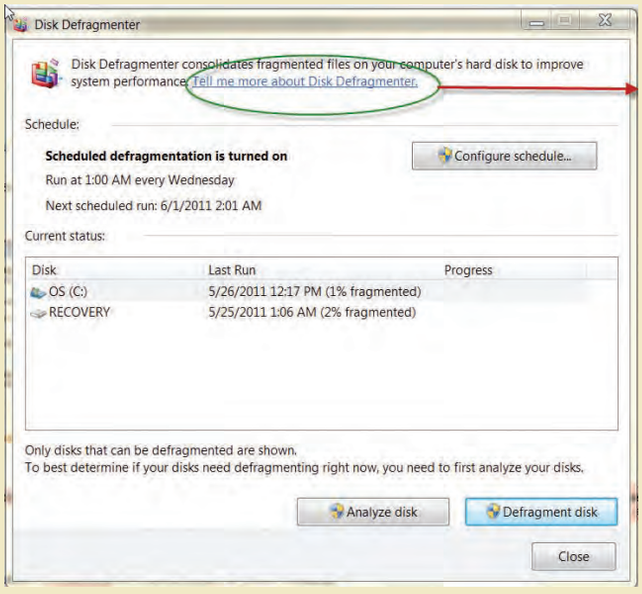
Note that the Mac with OS X does not use temp files in the manner of Windows. OS X has its own Disk Utility feature that will take care of many of the utility functions that we have discussed. Also, OnyX is a freeware utility available separately for conducting routine maintenance and tweaking the interface on the Mac.

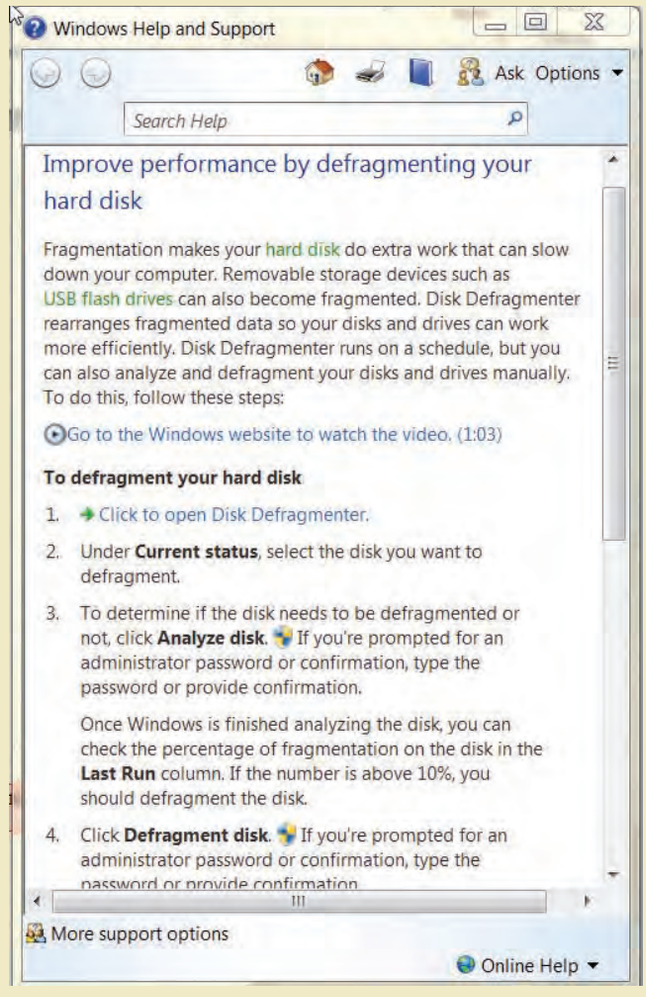
Many other utilities exist, such as those for transferring files back and forth between a desktop microcomputer and a laptop and for troubleshooting various types of system problems. Generally, the companies selling utilities do not manufacture the operating system. OS developers usually eventually incorporate the features of a proven utility as part of their product. (Note: Independent, or external, utilities must be compatible with your system software; check the software packaging and user documentation.)

Survival Tip

Temp File Removal

In Windows, to remove temporary and unnecessary files from your hard drive, Click *Start, All Programs, Accessories, System Tools*, and *Disk Cleanup*. Put checks in the boxes next to the types of file you want to delete, and click *OK*.

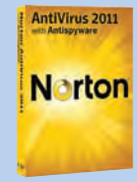

Disk Defragmenter
Disk Defragmenter consolidates fragmented files on your computer's hard disk to improve system performance. Tell me more about Disk Defragmenter.
Schedule:
Scheduled defragmentation is turned on
Configure schedule...
Run at 1:00 AM every Wednesday
Next scheduled run: 6/1/2011 2:01 AM
Current status:
Disk
Last Run
Progress
OS (C:)
5/26/2011 12:17 PM (1% fragmented)
RECOVERY
5/25/2011 1:06 AM (2% fragmented)
Only disks that can be defragmented are shown.
To best determine if your disks need defragmenting right now, you need to first analyze your disks.
Analyze disk
Defragment disk
Close


Windows Help and Support
Ask
Options
Search Help
Improve performance by defragmenting your hard disk
Fragmentation makes your hard disk do extra work that can slow down your computer. Removable storage devices such as USB flash drives can also become fragmented. Disk Defragmenter rearranges fragmented data so your disks and drives can work more efficiently. Disk Defragmenter runs on a schedule, but you can also analyze and defragment your disks and drives manually. To do this, follow these steps:
Go to the Windows website to watch the video. (1:03)
To defragment your hard disk
1. Click to open Disk Defragmenter.
2. Under Current status, select the disk you want to defragment.
3. To determine if the disk needs to be defragmented or not, click Analyze disk. If you're prompted for an administrator password or confirmation, type the password or provide confirmation.
Once Windows is finished analyzing the disk, you can check the percentage of fragmentation on the disk in the Last Run column. If the number is above 10%, you should defragment the disk.
4. Click Defragment disk. If you're prompted for an administrator password or confirmation, type the password or provide confirmation.
More support options
Online Help

panel 3.5

Preventing viruses

- If you download or install software from a network server (including the Internet), or an online service, always run virus scanning software on the folder/directory you place the new files in before you run/execute them.
- Make sure that you have a disk (e.g., CD) with your virus program so that you can reinstall the software if necessary. Or print out your purchase ID information and the link to the manufacturer's website so that you can re-download your software if you need to.
- Do not open any email from unknown sources, and do not open any attachments from unknown sources. (Also, set your antivirus software to check all attachments.)
- If your Internet connection is always on (e.g., cable), purchase firewall software or make sure that your OS is set properly to protect you from unauthorized intrusion.
- Never start your computer from an unknown CD or flash drive, and make sure secondary storage drives are empty before you boot your computer.



Survival Tip

Free Antivirus Software

For a list of free antivirus software, see:

www.thefreecountry.com/security/antivirus.shtml

www.pcworld.com/reviews/collection/1597/free_antivirus_software.html

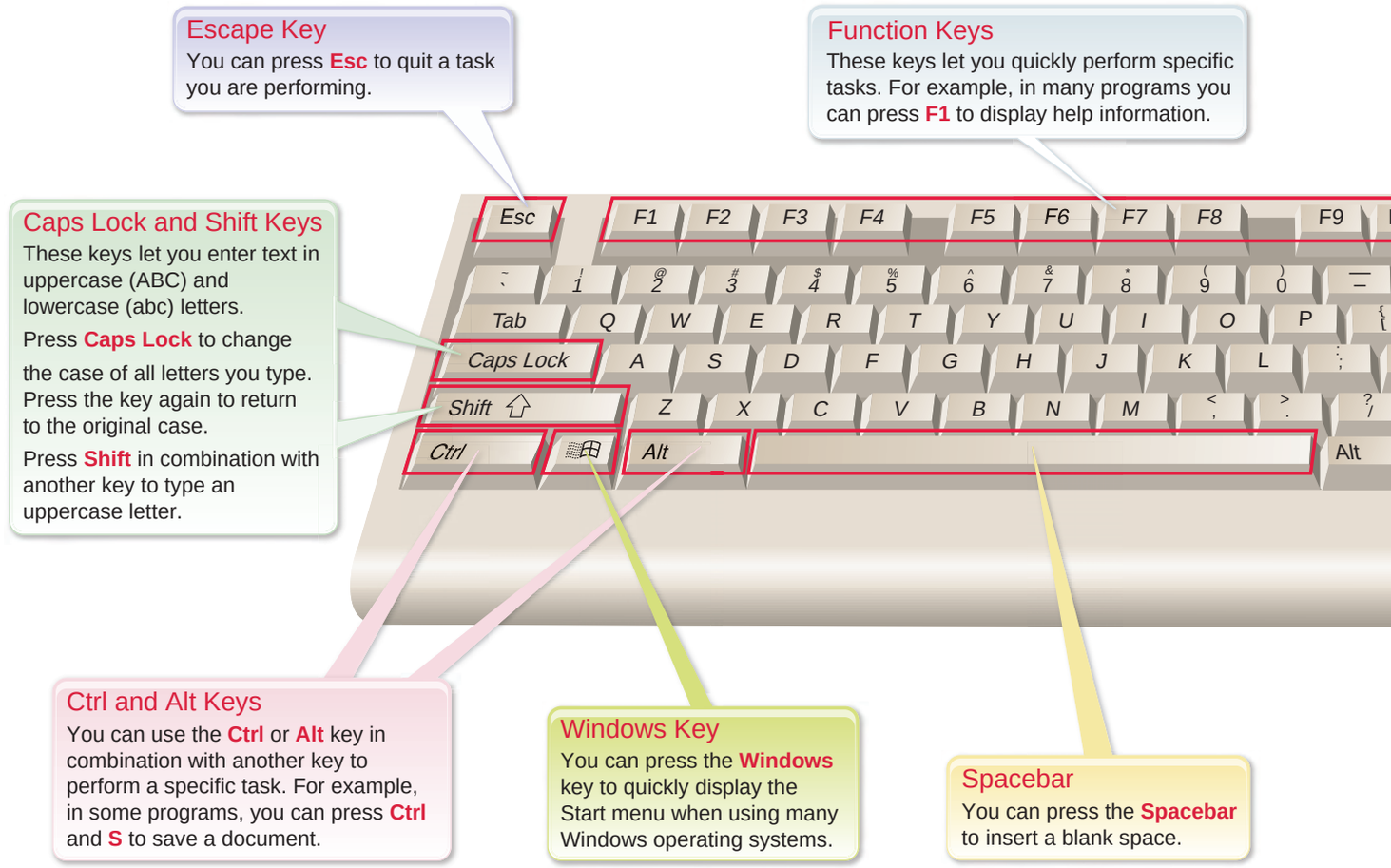
www.freebyte.com/antivirus/

Utilities: Service Programs

Utilities are small programs that play supporting roles.

***Utility programs*, also known as *service programs*, perform tasks related to the control, allocation, and maintenance of computer resources.** (See preceding Practical Action box.) They enhance existing functions or provide services not supplied by other system software programs. Most computers come with built-in utilities as part of the system software. However, they may also be bought separately as external utility programs (such as Norton SystemWorks and McAfee Utilities).

Among the tasks performed by utilities are backing up data, compressing files, recovering lost data, and identifying hardware problems. *(See the Practical Action box.)*


Escape Key
You can press Esc to quit a task you are performing.
Function Keys
These keys let you quickly perform specific tasks. For example, in many programs you can press F1 to display help information.
Caps Lock and Shift Keys
These keys let you enter text in uppercase (ABC) and lowercase (abc) letters.
Press Caps Lock to change the case of all letters you type. Press the key again to return to the original case.
Press Shift in combination with another key to type an uppercase letter.
Esc
F1 F2 F3 F4 F5 F6 F7 F8 F9
Tab
Caps Lock
Shift
Ctrl
Alt
Alt
Ctrl and Alt Keys
You can use the Ctrl or Alt key in combination with another key to perform a specific task. For example, in some programs, you can press Ctrl and S to save a document.
Windows Key
You can press the Windows key to quickly display the Start menu when using many Windows operating systems.
Spacebar
You can press the Spacebar to insert a blank space.

3.4 Common Features of the User Interface

User-interface features use graphics to facilitate a person's interaction with the computer.

The first thing you look at when you call up any system software on the screen is the ***user interface*—the user-controllable graphic display screen that allows you to communicate, or interact, with the computer.** Like the dashboard on a car, the user interface has gauges that show you what's going on and switches and buttons for controlling what you want to do. From this screen, you choose the application programs you want to run or the files of data you want to open.

You can interact with the display screen using the keys on your keyboard. As well as having letter, number, and punctuation keys and often a calculator-style numeric keypad, computer keyboards have special-purpose and function keys. *(● See Panel 3.6.)*

Special-purpose keys **are used to enter, delete, and edit data and to execute commands.** An example is the Esc (for "Escape") key, which tells the computer to cancel an operation or leave ("escape from") the current mode of operation. The Enter, or Return, key, which you will use often, tells the computer to execute certain commands and to start new paragraphs in a document. *Commands* are instructions that cause the software to perform specific actions.

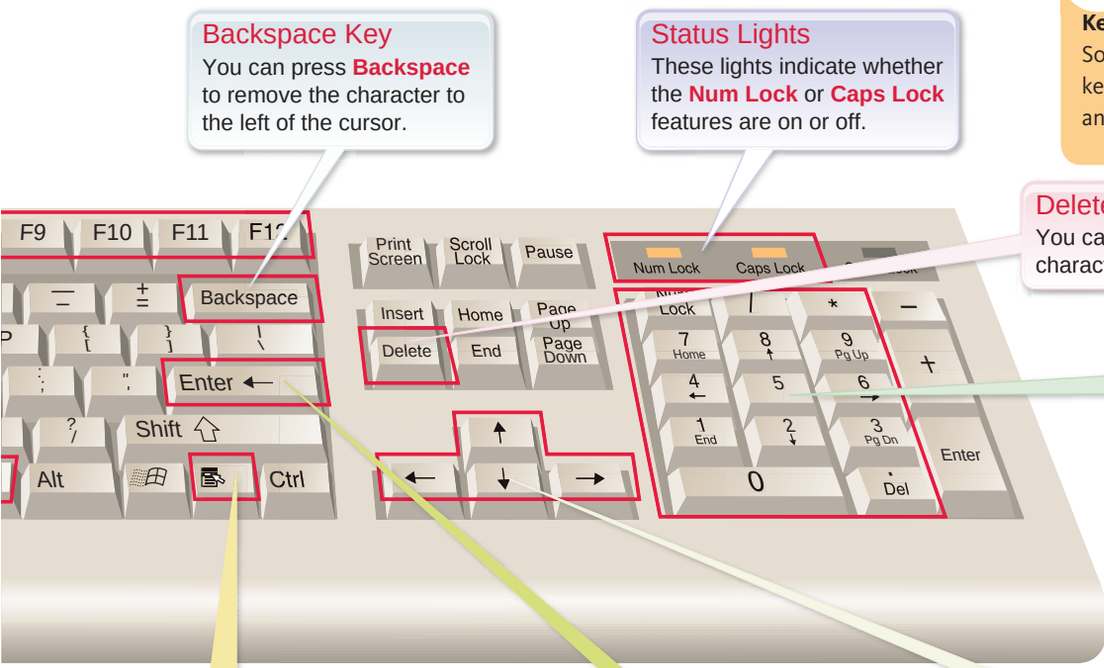
Special-purpose keys are generally used the same way regardless of the application software package being used. Most keyboards include the following special-purpose keys: *Esc, Ctrl, Alt, Del, Ins, Home, End, PgUp, PgDn, Num Lock,* and a few others. (For example, *Ctrl* means "Control," *Del* means "Delete," *Ins* means "Insert.")

Function keys**, labeled "F1," "F2," and so on, are usually positioned along the top of the keyboard. They are used to execute commands specific to the software being used.** For example, one application software package may use F6 to exit a file, whereas another may use F6 to underline a word.

panel 3.6

Keyboard functions

Some keyboards include other ("dedicated") keys, such as for direct Internet connection and email connection.



Backspace Key
You can press **Backspace** to remove the character to the left of the cursor.

Status Lights
These lights indicate whether the **Num Lock** or **Caps Lock** features are on or off.

Delete Key
You can press **Delete** to remove the character to the right of the cursor.

Numeric Keypad
When the **Num Lock** light is on, you can use the number keys (0 through 9) to enter numbers. When the **Num Lock** light is off, you can use these keys to move the cursor around the screen. To turn the light on or off, press **Num Lock.**

Arrow Keys
These keys let you move the cursor around the screen.

Application Key
You can press the **Application** key to quickly display the shortcut menu for an item on your screen. Shortcut menus display a list of commands commonly used to complete a task related to the current activity.

Enter Key
You can press **Enter** to tell the computer to carry out a task. In a word processing program, press this key to start a new paragraph.

more info!

Common Shortcuts (Macros)

Instead of using the mouse and menus to select options and perform functions—for example, to save, to print, to boldface a word, to copy text—you can often use 2-key shortcuts:

Windows:

www.microsoft.com/enable/products/KeyboardSearch_xp.aspx

http://support.microsoft.com/kb/126449

http://windows.microsoft.com/en-US/windows7/Keyboard-shortcuts

www.windows7news.com/2009/03/22/master-list-of-windows-7-keyboard-shortcuts/

Mac:

http://support.apple.com/kb/ht1343

www.danrodney.com/mac/

Sometimes you may wish to reduce the number of keystrokes required to execute a command. To do this, you use a macro. **A *macro*, also called a *keyboard shortcut*, is a single keystroke or command—or a series of keystrokes or commands—used to automatically issue a longer, predetermined series of keystrokes or commands.** Thus, you can consolidate several activities into only one or two keystrokes. The user names the macro and stores the corresponding command sequence; once this is done, the macro can be used repeatedly. (To set up a macro, pull down the Help menu and type in *macro*.)

Although many people have no need for macros, individuals who find themselves continually repeating complicated patterns of keystrokes say they are quite useful.

You will also frequently use your mouse to interact with the user interface. The mouse allows you to direct an on-screen pointer to perform any number of activities. **The *pointer* usually appears as an arrow, although it changes shape depending on the application. The mouse is used to move the pointer to a particular place on the display screen or to point to little symbols, or icons.** You can activate the function corresponding to the symbol by pressing ("clicking") buttons on the mouse. Using the mouse, you can pick up and slide ("drag") an image from one side of the screen to the other or change its size. *(● See Panel 3.7.)*

The GUI: The Graphical User Interface

The GUI's use of graphics makes it easy for computer users to interact with their machine.

Personal computers used to have *command-driven interfaces,* which required that you type in complicated-looking instructions (such as *copy a:\filename c:*

panel 3.7

Mouse language

Term	Action	Purpose
Point	Move mouse across desk to guide pointer to desired spot on screen. The pointer assumes different shapes, such as arrow, hand, or I-beam, depending on the task you're performing.	To execute commands, move objects, insert data, or similar actions on screen.
Click	Press and quickly release left mouse button.	To select an item on the screen.
Double-click	Quickly press and release left mouse button twice.	To open a document or start a program.
Drag and drop	Position pointer over item on screen, press and hold down left mouse button while moving pointer to location in which you want to place item, then release.	To move an item on the screen.
Right-click	Press and release right mouse button.	To display a shortcut list of commands, such as a pop-up menu of options.

to copy a file from an old floppy disk to a hard disk). In the next version, they also had *menu-driven interfaces,* in which you could use the arrow keys on your keyboard (or a mouse) to choose a command from a menu, or a list of activities.

Today the computer's "dashboard" is usually a ***graphical user interface (GUI)*** (pronounced "gooey"), **which allows you to use a mouse or keystrokes to select icons (little graphic symbols) and commands from menus or menu bars (lists of activities).** The GUIs on the PC and on the Apple Macintosh (which was the first easy-to-use personal computer available on a wide scale) are somewhat similar. Once you learn one version, it's fairly easy to learn the other. However, the best-known GUI is that of Microsoft Windows system software. *(● See Panel 3.8, next page.)*

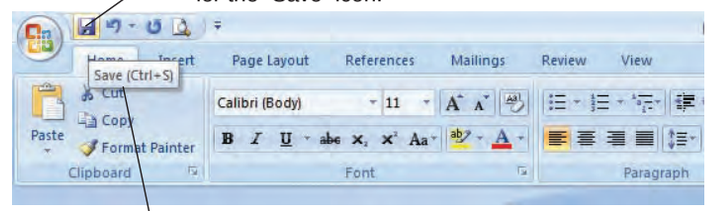
DESKTOP, ICONS, & MENUS Three features of a GUI are the desktop, icons, and menus.

- **Desktop:** After you turn on the computer, the first screen you will encounter is the *desktop (Panel 3.8),* a term that embodies the idea of folders of work (memos, schedules, to-do lists) on a businessperson's desk. **The *desktop,* which is the system's main interface screen, displays pictures (icons) that provide quick access to programs and information.**

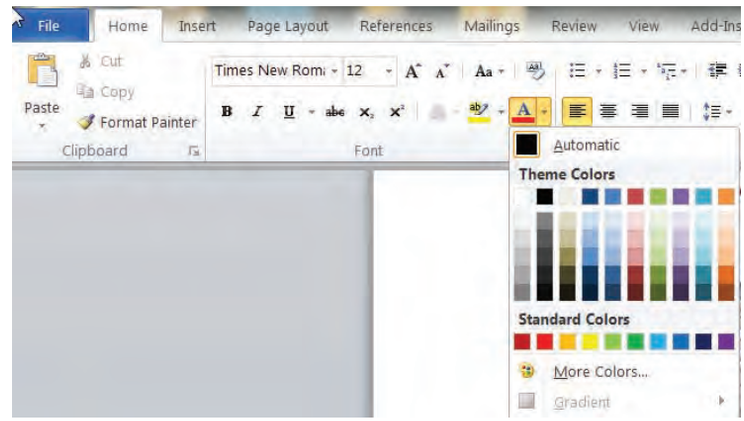
- **Icons and rollovers:** We're now ready to give a formal definition: ***Icons*** **are small pictorial figures that represent programs, data files, or procedures.** For example, a trash can represents a place to dispose of a file you no longer want. If you click your mouse pointer on a little picture of a printer, you can print out a document. One of the most important icons is the *folder,* a representation of a manila folder; folders hold the files in which you store your documents and other data.

  Of course, you can't always be expected to know what an icon or graphic means. **A *rollover* feature (also called a *tooltip*), a small text box explaining the icon's function, appears when you roll the mouse pointer over the icon. A rollover may also produce an animated graphic.**

Icon: Symbol representing a program, data file,or procedure. Icons are designed to graphically communicate their function, such as a little disk for the "Save" icon.



Rollover: When you roll your mouse pointer over an icon (in this case, the "Save" icon), a small box with explanatory text appears



When you click the mouse on the menu bar, a list of options appears or pulls down like a shade—for example, the color choices menu on the right.

- **Menus:** Like a restaurant menu, a ***menu*** **offers you a list of options to choose from**—in this case, a list of commands for manipulating data, such as Print or Edit. Menus are of several types. Resembling a pull-down window shade, a *pull-down menu,* also called a *drop-down menu,* is a list of options that pulls down from the menu bar at the top of the screen. For example, if you use the mouse to "click on" (activate) a command (for example, File) on the menu bar, you will see a pull-down menu offering further commands.

OutlookExpress: Window's email program.

Microsoft Network: Click here to connect to Microsoft Network (MSN), the company's online service.

My Documents: Where your documents are stored (unless you specify otherwise), in folders you create and name.

Network Neighborhood: If your PC is linked to a network, click here to get a glimpse of everything on the network.

My Computer: Gives you a quick overview of all the files and programs on your PC, as well as available drives (A:, C:, D:, E:).

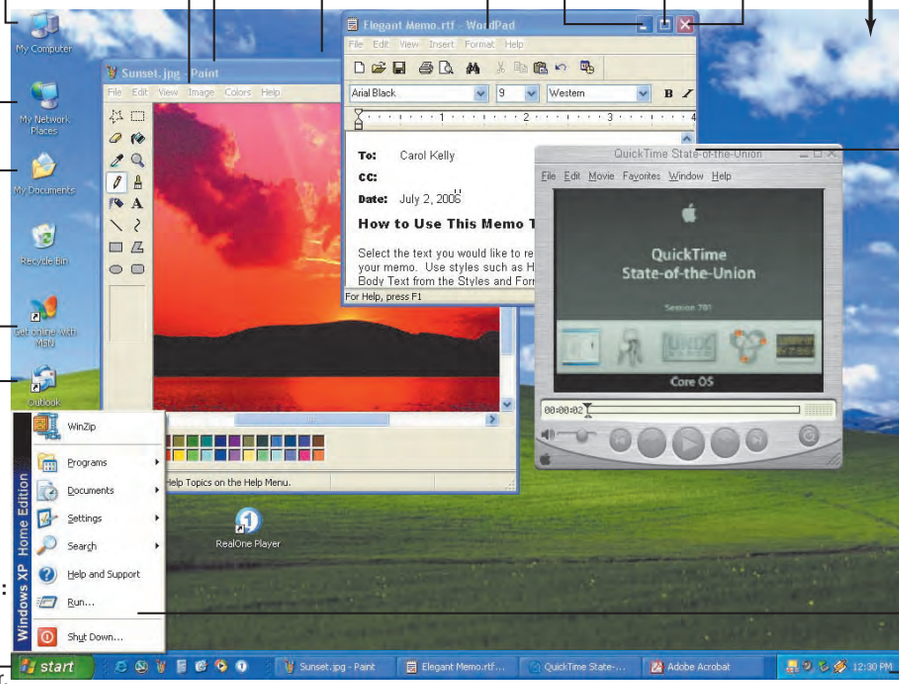
Documents: Multitasking capabilities allow users to smoothly run more than one program at once.

The opening screen is the **desktop.**

Menu bar

Title bar

Minimize Maximize Close



Multimedia: Windows XP features sharp graphics and video capabilities.

Taskbar: Gives you a log of all programs you have opened. To switch programs, click on the icon buttons on the taskbar.

Start menu: After clicking on the Start button, a menu appears, giving you a quick way to handle common tasks. You can launch programs, call up documents, change system settings, get help, and shut down.

Start button: Click for an easy way to start using the computer.

OutlookExpress: Window's email program.

Computer: Gives you a quick overview of all the files and programs on your PC, as well as available drives (A:, C:, D:, E:).

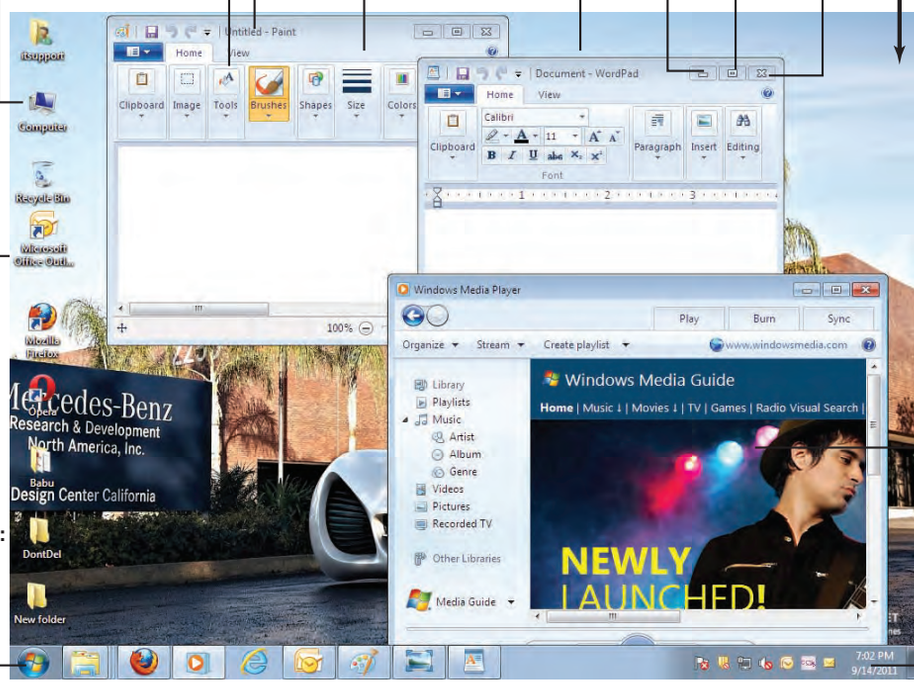
Documents: Multitasking capabilities allow users to smoothly run more than one program at once.

The opening screen is the **desktop.**

Menu bar

Title bar

Minimize Maximize Close



Multimedia: Windows XP features sharp graphics and video capabilities.

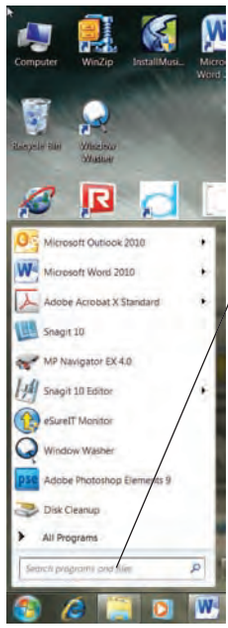
Taskbar: Gives you a log of all programs you have opened. To switch programs, click on the icon buttons on the taskbar.

Start button: Click for an easy way to start using the computer.

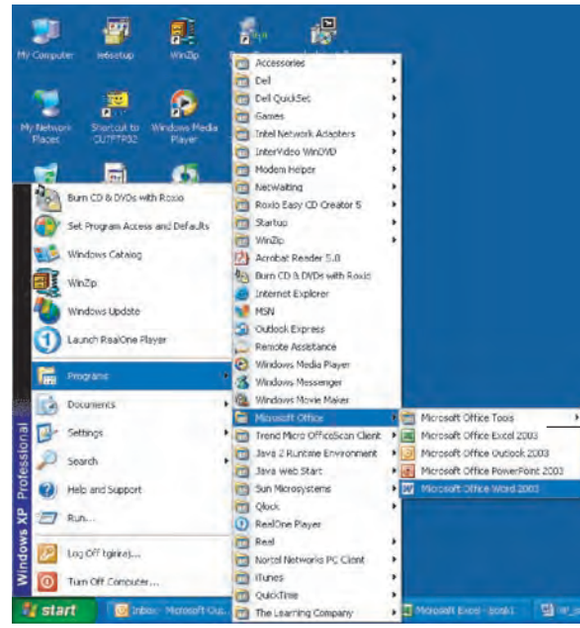
panel 3.8

PC graphical user interfaces (desktop)

(*Top*) Windows XP; (*bottom*) Windows 7 (Icons may differ on your PC.)



Pull-up menu—When you click the mouse pointer on the Start button at the bottom-left corner of the screen, it produces a pull-up menu offering access to programs and documents.



Cascading menu: Moving the mouse pointer to an option on the pull-up menu in some versions of Windows produces flyout (cascading) menus with more options.

Choosing one of these options may produce further menus called *cascading menus (top right),* menus that seem to fly back to the left or explode out to the right, wherever there is space.

DOCUMENTS, TITLE BARS, MENU BARS, TOOLBARS, TASKBARS, & WINDOWS (SMALL "W") If you want to go to a document, there are three general ways to begin working from a typical Microsoft Windows GUI desktop: (1) You can click on the *Start* button at the lower left corner and then make a selection from the pull-up menu that appears. (2) Or you can click on the *My Computer* (just *Computer* in Windows 7) icon on the desktop and pursue the choices offered there. (3) Or click on the *My Documents* icon (a folder icon with your name under it in Windows 7) and then on the folder that contains the document you want. In each case, the result is the same: the document is displayed in the window. *(● See Panel 3.9, next page.)*

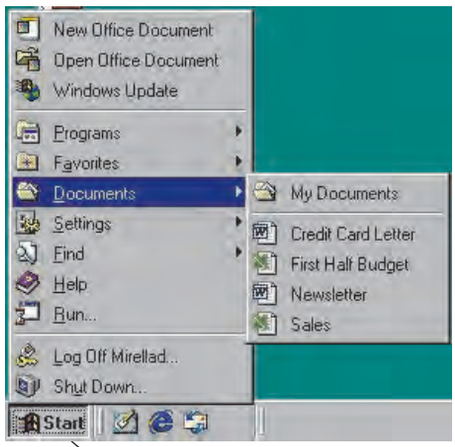
Once past the desktop—which is the GUI's opening screen—if you click on the *My Computer* icon, you will encounter various "bars" and window functions. *(● See Panel 3.10, p. 137.)*

- **Title bar: The *title bar* runs across the very top of the display window and shows the name of the folder you are in**—for example, "My Computer."
- **Menu bar:** Below the title bar is the ***menu bar,* which shows the names of the various pull-down menus available.** Examples of menus are File, Edit, View, Favorites, Tools, and Help.
- **Toolbar: The *toolbar,* below the menu bar, displays menus and icons representing frequently used options or commands.** An example of an icon is the picture of two pages in an open folder with a superimposed arrow, which issues a *Copy to* command.
- **Taskbar:** In Windows, the ***taskbar* is the bar across the bottom of the desktop screen that contains the Start button and that appears by default.** Small boxes appear here that show the names of open files. You can switch among the files by clicking on the boxes.
- **Windows:** When spelled with a capital "W," Windows is the name of Microsoft's system software (Windows XP, Vista, 7, and so on). When spelled with a lowercase "w," a ***window* is a rectangular frame on the computer display screen. Through this frame you can view a file of data—such as a document, spreadsheet, or database—or an application program.**

panel 3.9

Three ways to go to a document in Windows XP and three ways in Windows 7 (*bottom*)

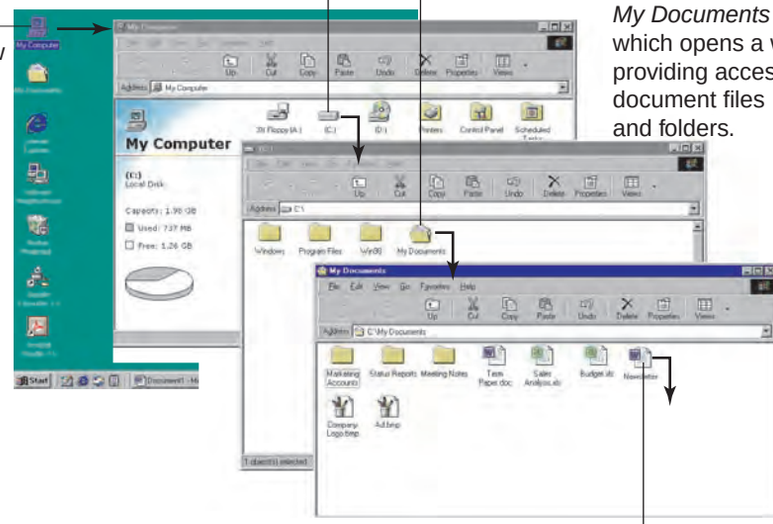
FROM START MENU



Click on the Start button to produce Start menu, then go to *Documents* option, then to *My Documents.* Click on the item you want.

FROM MY COMPUTER

Click on the *My Computer* icon, which opens a window that provides access to information on your computer.



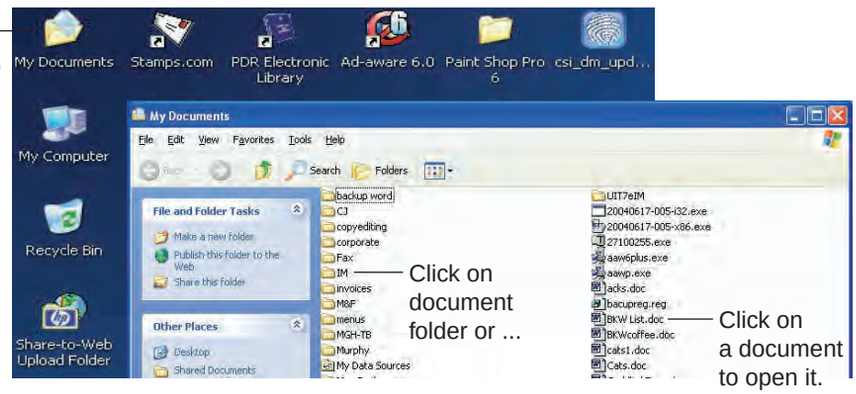
Click on C, which opens a window that provides access to information stored on your hard disk.

Click on the *My Documents* icon, which opens a window providing access to document files and folders.

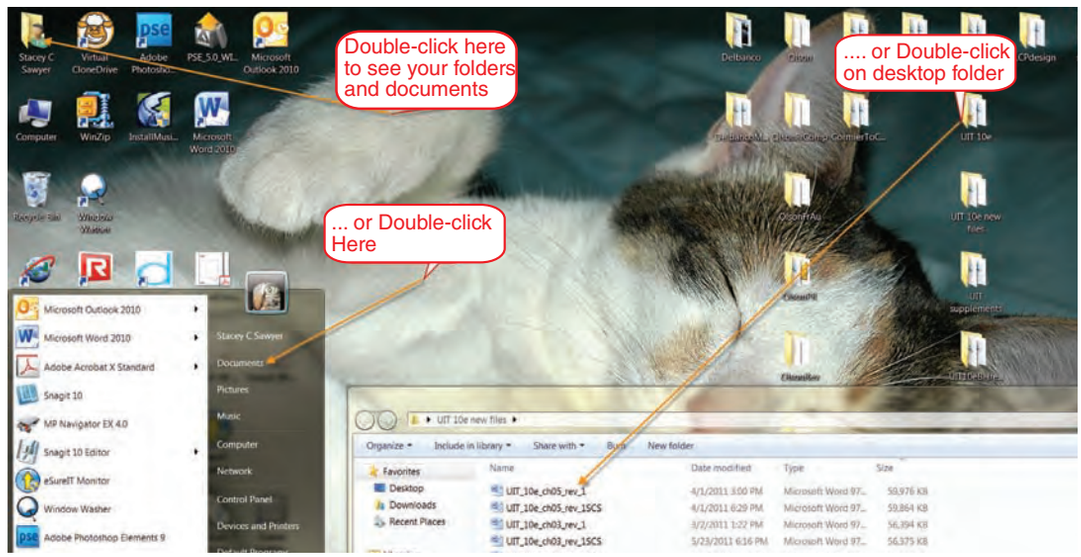
Click on the document you want.

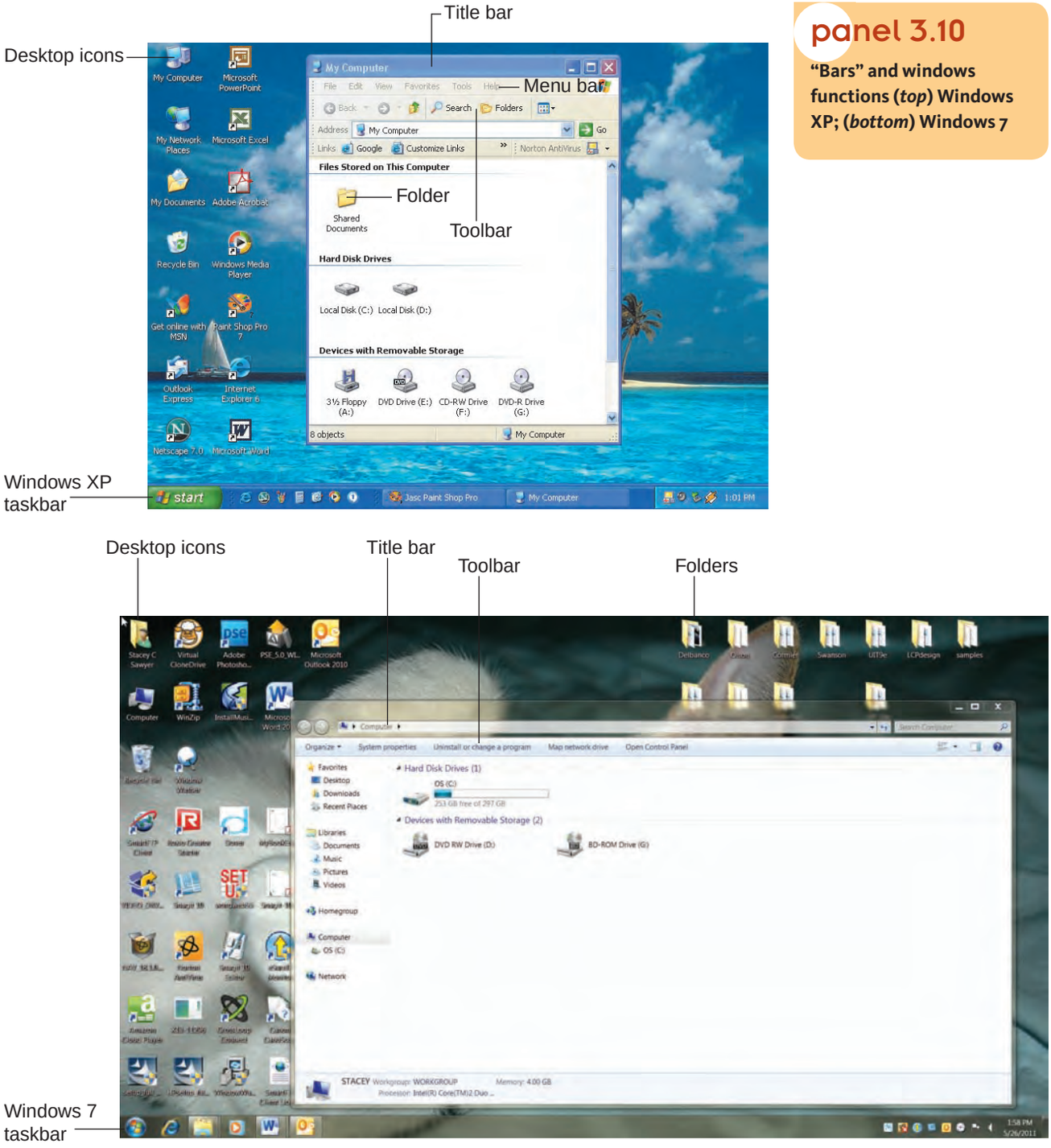
FROM MY DOCUMENTS ICON

Click on *My Documents*, which opens a window that shows the names of your documents/ document folders.



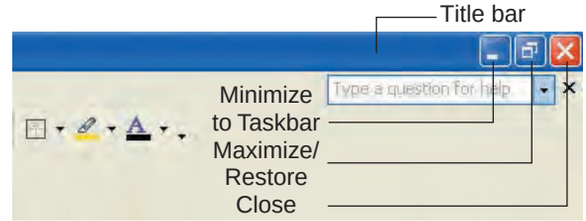
IN WINDOWS 7





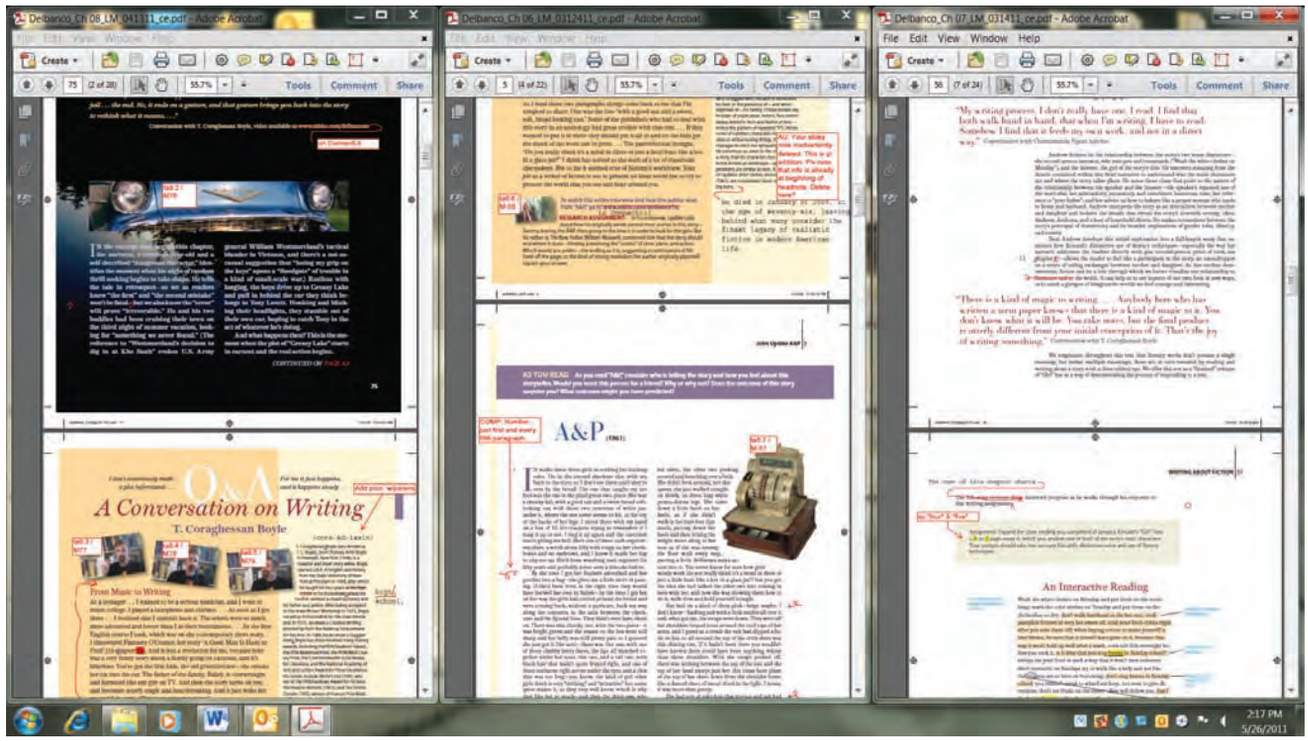
panel 3.10

"Bars" and windows functions (*top*) Windows XP; (*bottom*) Windows 7



In the upper right-hand corner of the Windows title bar are some window controls—three icons that represent *Minimize, Maximize and Restore Down,* and *Close.* By clicking on these icons, you can *minimize* the window (shrink it down to an icon at the bottom of the screen), *make the application window fill the entire desktop window* (*maximize*) *or restore the application window to its original size* (*restore down*), or *close* it (exit the file and make the window disappear).You can also use the mouse to move the window around the desktop, by clicking on and dragging the title bar.

Finally, you can create *multiple windows* to show programs running concurrently. For example, one window might show the text of a paper you're



Multiple windows

working on, another might show the reference section for the paper, and a third might show something you're downloading from the Internet. If you have more than one window open, click on the Maximize button of the window you want to be the main window to *restore* it.

The Help Command

The Help function solves problems for you when you've forgotten how to do something on the computer.

Don't understand how to do something? Forgotten a command? Accidentally pressed some keys that messed up your screen layout and you want to undo it? Most toolbars contain a ***Help command*—a command generating a table of contents, an index, and a search feature that can help you locate answers**, often on the web**.** In addition, many applications have *context-sensitive help,* which leads you to information about the task you're performing. *(● See Panel 3.11.)*

Survival Tip

Don't Trash Those Icons

In Windows, don't delete unwanted software programs by using the mouse to drag their icons to the recycle bin. This might leave behind system files that could cause problems. Instead, use an "uninstall" utility. In Windows, go to *Start, Settings, Control Panel;* double-click *Add/Remove Programs.* Find the program you want to delete, and click the *Add/Remove* button. (In the Mac OS, one can often—but not always—uninstall programs by dragging icons into the trash; see the Mac user's manual.)

3.5 Common Operating Systems

The main operating systems for general computer users are Windows, Mac OS, and Unix/Linux.

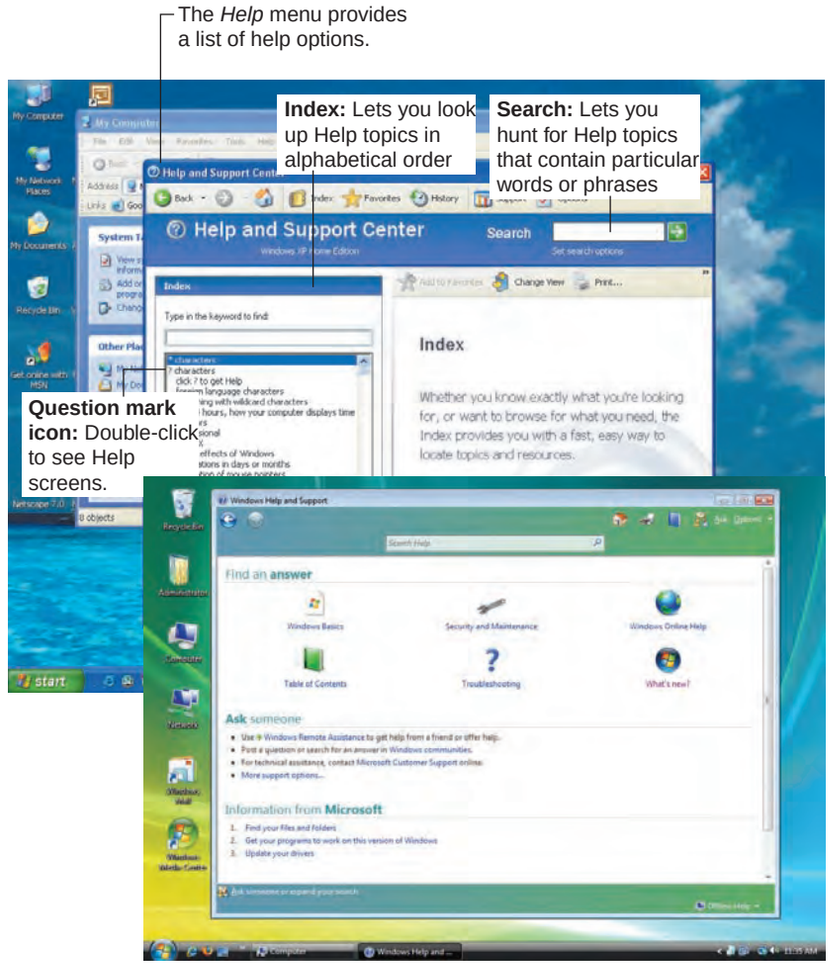
The *platform* is the particular processor model and operating system on which a computer system is based. For example, there are "Mac platforms" (Apple Macintosh), "Windows platforms" and "PC platforms" (for personal computers such as Dell, Compaq, Lenovo, Gateway, and Hewlett-Packard, which run Microsoft Windows), and "Unix/Linux platforms," often used on large computer systems. (Note: Although all computers can be called "personal computers," "PC" still generally refers to Microsoft-based computers, because "PC" evolved from "PC-DOS" as described next.)

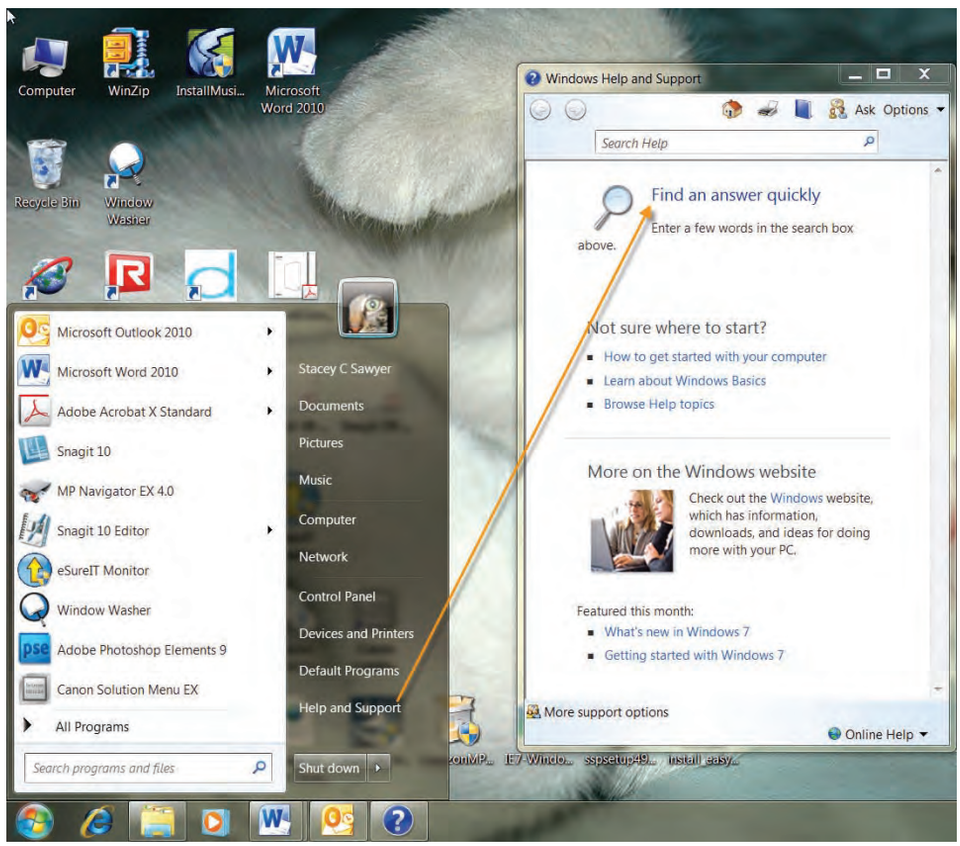
Despite the dominance of these platforms, some so-called *legacy systems* are still in use. A legacy system is an older, outdated, yet still functional technology, such as the *DOS operating system. DOS* (rhymes with "boss")—for *Disk Operating System*—was the original operating system produced by Microsoft

Survival Tip

Getting Help

On Windows computers, you can find the Help area by pressing the *F1* key. Or use the mouse to click on *Start* in the lower left screen; then click on *Help.* On the Macintosh, Help is located under the main menu bar.


The *Help* menu provides a list of help options.
Index: Lets you look up Help topics in alphabetical order
Search: Lets you hunt for Help topics that contain particular words or phrases
Question mark icon: Double-click to see Help screens.
Help and Support Center
Search
Index
Type in the keyword to find:
Whether you know exactly what you're looking for, or want to browse for what you need, the Index provides you with a fast, easy way to locate topics and resources.
Windows Help and Support
Find an answer
Ask someone
Information from Microsoft



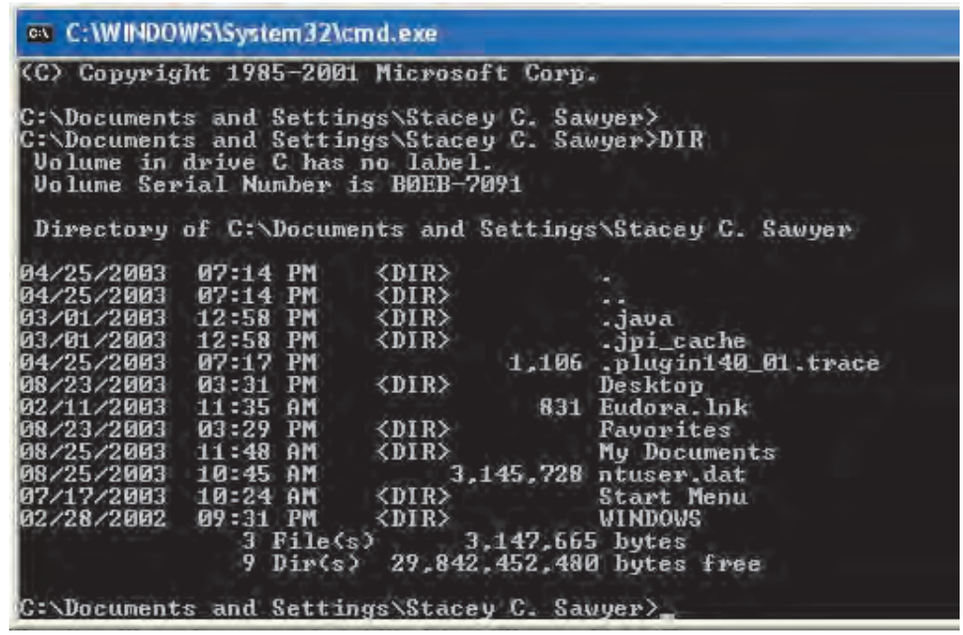
panel 3.11

Help features

(*Top*) The XP Help command yields a pull-down menu; (*bottom*) the Help screen for Windows 7, reached from the Start button at the bottom-left corner of the screen.

panel 3.12

DOS screen: command-line user interface


C:\WINDOWS\System32\cmd.exe
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\Stacey C. Sawyer>
C:\Documents and Settings\Stacey C. Sawyer>DIR
Volume in drive C has no label.
Volume Serial Number is B0EB-7091
Directory of C:\Documents and Settings\Stacey C. Sawyer
04/25/2003 07:14 PM <DIR> .
04/25/2003 07:14 PM <DIR> ..
03/01/2003 12:58 PM <DIR> .java
03/01/2003 12:58 PM <DIR> .jpi_cache
04/25/2003 07:17 PM 1,106 .plugin140_01.trace
08/23/2003 03:31 PM <DIR> Desktop
02/11/2003 11:35 AM 831 Eudora.lnk
08/23/2003 03:29 PM <DIR> Favorites
08/25/2003 11:48 AM <DIR> My Documents
08/25/2003 10:45 AM 3,145,728 ntuser.dat
07/17/2003 10:24 AM <DIR> Start Menu
02/28/2002 09:31 PM <DIR> WINDOWS
3 File(s) 3,147,665 bytes
9 Dir(s) 29,842,452,480 bytes free
C:\Documents and Settings\Stacey C. Sawyer>

and had a hard-to-use command-driven user interface. *(● See Panel 3.12.)* Its initial 1982 version was designed to run on the IBM PC as PC-DOS. Later Microsoft licensed the same system to other computer makers as MS-DOS.

Here we briefly describe the principal platforms used on *single-user, stand-alone* computers today, both desktops and laptops: the Apple Macintosh OS and Microsoft Windows. We discuss operating systems for *networks* (servers) and for *embedded systems* (handheld computers and some consumer devices) in a few pages.

Macintosh Operating System

The Mac had a GUI before Windows did.

The *Macintosh operating system (Mac OS)*, which runs on Apple Macintosh computers, set the standard for icon-oriented, easy-to-use graphical user interfaces. Apple based its new interface on work done at Xerox, which in turn had based its work on early research at Stanford Research Institute (now SRI International). (See the timeline starting on page 170.) The software generated a strong legion of fans shortly after its launch in 1984 and inspired rival Microsoft to upgrade DOS to the more user-friendly Windows operating systems.

MAC OS X The Mac OS is *proprietary,* meaning that it is privately owned and controlled by a company. Some Mac users still use System 9, introduced in October 1999, which added an integrated search engine, updated the GUI, and improved networking services. The next version of the operating system, Mac OS X ("ex" or "10"), broke with 15 years of Mac software to use Unix (discussed shortly) to offer a dramatic new look and feel. *(● See Panel 3.13.)* Many Apple users claim that OS X won't allow software conflicts, a frequent headache with Microsoft's Windows operating systems. (For example, you might install a game and find that it interferes with the device driver for a sound card. Then, when you uninstall the game, the problem persists. With Mac OS X, when you try to install an application program that conflicts with any other program, the Mac simply won't allow you to run it.) Mac OS X also offers free universal email services, improved graphics and printing, improved security, easier ways to find files, and support for building and storing web pages. Also, new Macs can also support Windows, using a built-in utility called Boot Camp—meaning that it lets you boot up the computer using either the Mac OS or Windows.

panel 3.13

Mac OS X screens—graphical user interface

more info!

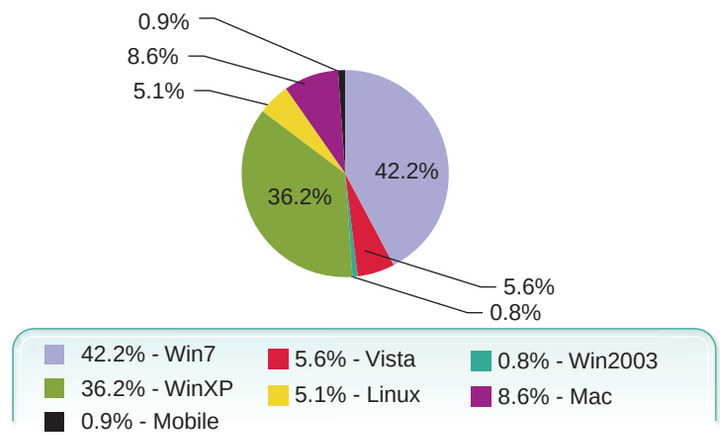
Mac Apps

To see the wide variety of applications available to download for the Mac, go to:

www.apple.com/downloads/macosx/

The latest version of OS X, 10.7, or Lion, was released in 2010 and for now is available only via download or on a USB flash drive. Lion offers several new features, including increased support for gesture control of the computer via a multitouch screen. To take full advantage of all Lion's features, users must purchase applications written specifically for Lion.

As of 2011 Mac OS X is the second most popular general-purpose operating system in use (about 8%), after Microsoft Windows (about 85%). *(● See Panel 3.14.)*



panel 3.14

OS market shares September 2011 (*www.w3schools.com/browsers/browsers_os.asp*)

WHERE IS MAC MOST POPULAR? Macintosh is considered king in areas such as desktop publishing and graphics, and Macs are still favored in many educational settings. For very specialized applications, most programs are written for the Windows platform. However, programs for games and for common business uses such as word processing and spreadsheets are also widely available for the Mac.

Note that many Macs can work with Microsoft PC (Windows) applications, such as Word.

Microsoft Windows

Another graphical user interface.

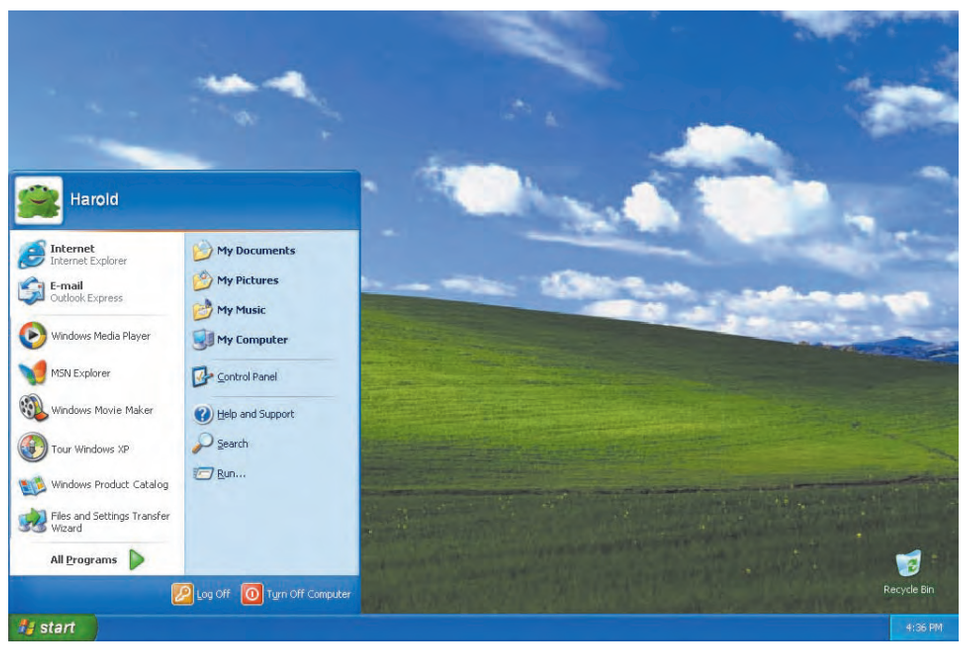
In the 1980s, taking its cue from the popularity of Mac's easy-to-use GUI, Microsoft began working on Windows to make DOS more user-friendly. Also a proprietary system, ***Microsoft Windows*** **is the most common operating system for desktop and portable PCs.** Early attempts (Windows 1.0, 2.0, 3.0) did not catch on. However, in 1992 *Windows 3.X* emerged as the preferred system among PC users. (Technically, Windows 3.X wasn't a full operating system; it was simply a layer or "shell" over DOS.)

Windows 3.X evolved into the *Windows 95* operating system, which was succeeded by *Windows 98* and *Windows Me* (for *Millennium Edition*). *Microsoft Windows XP,* introduced in 2001, combined elements of Windows networking software and Windows Me with a new GUI. *(● See Panel 3.15.)*

Windows Vista was introduced to consumers in January 2007. *(● See Panel 3.16.)* It is the equivalent of Windows version 12—preceded by 1.0, 2.0, 3.0, 3.1, NT, 95, NT 4.0, 98, 2000, ME, XP. So much computing power was required to run Vista that many people found their new PCs ran more slowly than their

Aerial view of Microsoft's Redmond, Washington, main corporate campus, which spreads over several square miles of the Seattle suburb.

panel 3.15
Windows XP



panel 3.16

Vista desktop screen showing a computer's various storage locations

older, less powerful XP machines. Vista was also criticized for software and hardware incompatibility issues with office suites and some printers, digital cameras, and other devices. So, many businesses decided that, given the downturn in the economy, they wouldn't be upgrading from XP to Vista, because they saw no value in it and because it required buying more powerful PCs and new software. To spur Vista sales, Microsoft announced it would stop selling Windows XP in June 2008. However, in spite of this change, Vista did not sell well, so Microsoft moved on to Windows 7.

Windows 7, currently the most widely used version of Microsoft Windows, was released during the 2009 holiday season. The new operating system supports iPhone-like touchscreen applications called Microsoft Surface, an alternative to the computer mouse. Thus, if you download the software for it, you can manipulate objects on the screen with your hands, such as enlarge and shrink photos or navigate a city map by stroking the screen. *(• See Panel 3.17, next page.)* Windows 7 is less power-hungry than Vista, boots up more quickly than previous Windows systems, and has improved networking and security features. It is used on desktops, laptops, notebooks, and tablets. Also, with the addition of Windows Media Center, you can turn your PC into a TV. (Windows 8 is expected to be released in 2012. Technology writers expect Windows 8 to move from the WIMP [windows, icons, menus, pointing devices) generation to the MPG (multitiouch, physics, and gestures) generation of computing, currently represented by Apple's OS X Lion operating system.)

A problem for any version of Windows, however, is that it builds on the same core architecture that represents more than 20 years of legacies. Some believe that Microsoft needs to do what Apple did when it introduced its Mac OS X in 2001: start over from scratch. Although this risked alienating some Macintosh users, since it forced them to buy new versions of their existing Mac applications software, it also made the system less vulnerable to crashes. "A monolithic operating system like Windows perpetuates an obsolete design," said one critic. "We don't need to load up our machines with bloated layers we won't use."[3]

Windows 7 comes in various versions:

- **Home Premium:** For general PC users; includes basic multimedia functions
- **Professional:** Mainly for small businesses but appropriate for the advanced home user; can run XP applications

Survival Tip

New Installation

Every time you install or reinstall Windows, you will have to get Microsoft's permission to activate it. You can do this over the Internet or via the phone.

Survival Tip

OEM

If you buy a computer with Windows (or any other operating system) already installed, the OS is called an *OEM (original equipment manufacturer) version*. If you buy your OS off the shelf, it is called a *retail version*. These two versions are almost identical, except an OEM version will install only on the *specific* machine for which it was intended. A retail version will install on any compatible machine. If you have an OEM version, you have to call the computer manufacturer, not the OS producer, for technical support. Because a retail version is not specifically tailored for your particular computer, Microsoft recommends that, before you buy a retail version of an OS, you run a compatibility check at its website (*http://support.microsoft.com*).

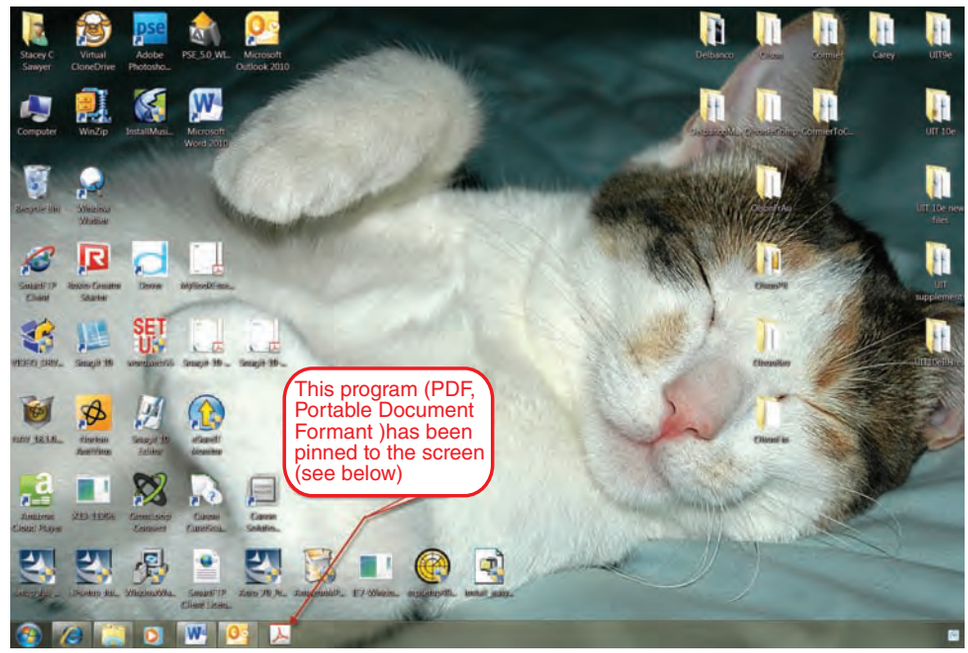
more info!

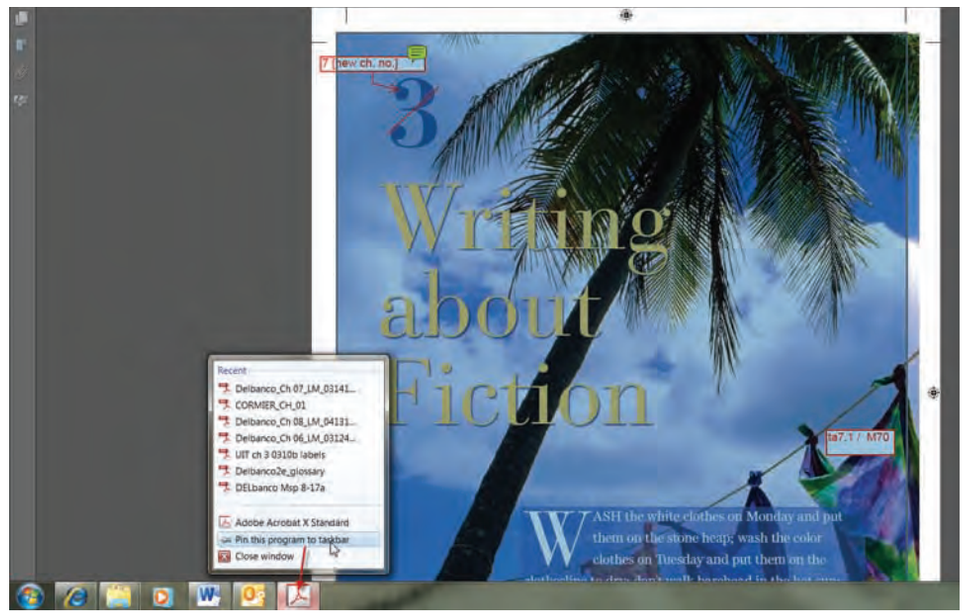
To explore Windows 7 on videos, go to:

www.microsoft.com/windows/explore/default.aspx

panel 3.17

Windows 7 desktop screen
New feature: You can pin a program directly to the taskbar so you can open it quickly and conveniently, rather than looking for the program in the Start menu.





- **Enterprise:** For multiuser businesses
- **Ultimate:** For advanced PC users, gamers, multimedia professionals; users can switch among 35 languages; can run XP applications

Network Operating Systems: OES, Windows Server, Unix, & Linux

Abbreviated NOS, a network operating system includes special functions for connecting computers and devices into a local-area network (LAN).

The operating systems described so far were principally designed for use with stand-alone desktop and laptop machines. Now let's consider the important operating systems designed to work with sizeable networks—OES, Windows Server, Unix/Solaris, and Linux.

NOVELL'S OPEN ENTERPRISE SERVER *NetWare,* now called *Open Enterprise Server* (*OES*), has long been a popular network operating system for coordinating

more info!

Windows vs. Mac

To compare Windows to the Mac, go to:

www.laptopmag.com/mobile-life/snow-leopard-vs-windows-7.aspx

www.guidenet.net/resources/win_vs_mac.html

http://windows.about.com/b/2010/02/05/windows-vs-mac-which-is-safer.htm

or do keyword searches for "Mac vs. Windows" and "Mac vs. PC."

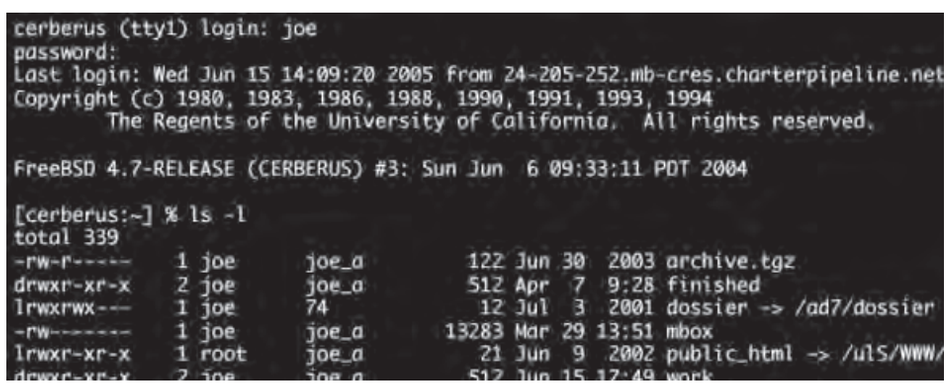
microcomputer-based local area networks (LANs) throughout a company or a campus. LANs allow PCs to share programs, data files, and printers and other devices. A network OS is usually located on a main server (see Chapter 1, p. 27), which controls the connectivity of connected smaller networks and individual computers. Novell, the maker of OES, thrived as corporate data managers realized that networks of PCs could exchange information more cheaply than the previous generation of mainframes and midrange computers.

WINDOWS SERVER Windows desktop operating systems (XP/Vista/7) can be used to link PCs in small networks in homes and offices. However, something more powerful was needed to run the huge networks linking a variety of computers—PCs, workstations, mainframes—used by many companies, universities, and other organizations, which previously were served principally by Unix and NetWare operating systems. ***Microsoft Windows Server*** **is the company's multitasking operating system designed to run on network servers in businesses of all sizes.** It allows multiple users to share resources such as data, programs, and printers and to build web applications and connect to the Internet.

The Windows Server networking OS comes in various versions and some of its functions are built into XP, Vista, and Windows 7.

UNIX, SOLARIS, & BSD Unix (pronounced "*you*-nicks") was developed at AT&T's Bell Laboratories in 1969 as an operating system for minicomputers. By the 1980s AT&T entered into partnership with Sun Microsystems to develop a standardized version of Unix for sale to industry. Today ***Unix*** **is a proprietary multitasking operating system for multiple users that has built-in networking capability and versions that can run on all kinds of computers.** (Note: it is a common misconception that Unix is open-source software [p. 146]; only a few versions of Unix-like OSs are open source.) It is used mostly on mainframes, workstations, and servers, rather than on microcomputers. Government agencies, universities, research institutions, large corporations, and banks commonly use Unix for everything from designing airplane parts to currency trading. Because it is particularly stable and reliable, Unix is also used for website management and runs the backbone of the Internet. The developers of the Internet built their communications system around Unix because it has the ability to keep large systems (with hundreds of processors) churning out transactions day in and day out for years without fail.

- **Versions of Unix:** Sun Microsystem's *Solaris* is a version of Unix that is popular for handling large e-commerce servers and large websites. Another interesting variant is *BSD,* free software derived from Unix. BSD began in the 1970s in the computer science department of the University of California, Berkeley, when students and staff began to develop their own derivative of Unix, known as the Berkeley Software Distribution, or BSD. And there are many other versions of Unix. Like MS-DOS, Unix uses a command-line interface (but the commands are different for each system). *(● See Panel 3.18.)* Some companies market Unix systems with graphical interface shells that make Unix easier to use.


cerberus (tty1) login: joe
password:
Last login: Wed Jun 15 14:09:20 2005 from 24-205-252.mb-cres.charterpipeline.net
Copyright (c) 1980, 1983, 1986, 1988, 1990, 1991, 1993, 1994
The Regents of the University of California. All rights reserved.
FreeBSD 4.7-RELEASE (CERBERUS) #3: Sun Jun 6 09:33:11 PDT 2004
[cerberus:~] % ls -l
total 339
-rw-r----- 1 joe joe_a 122 Jun 30 2003 archive.tgz
drwxr-xr-x 2 joe joe_a 512 Apr 7 9:28 finished
lrwxrwx--- 1 joe 74 12 Jul 3 2001 dossier -> /ad7/dossier
-rw------- 1 joe joe_a 13283 Mar 29 13:51 mbox
lrwxr-xr-x 1 root joe_a 21 Jun 9 2002 public_html -> /ulS/WWW/

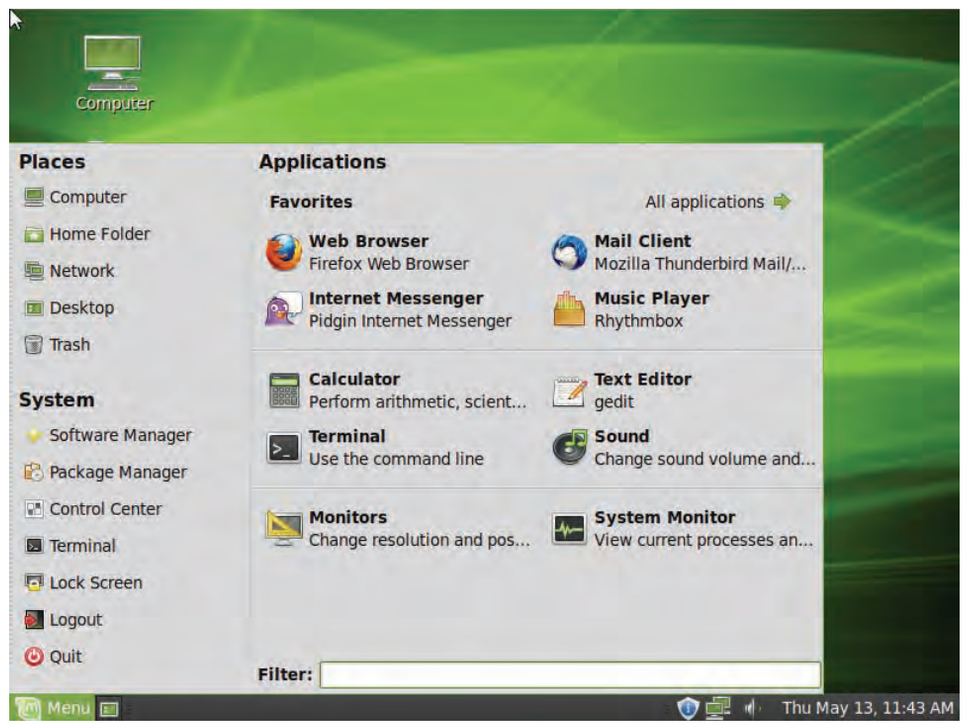
panel 3.18
Partial Unix screen

Some Common Unix Commands

^h, [backspace]	erase previously typed character
^u	erase entire line of input typed so far
cp	copy files
whoami	who is logged on to this terminal
mkdir	make new directory
mv	change name of directory
mail	read/send email
gzip, gunzip	compress, recompress a file
lpr	send file to printer
wc	count characters, words, and lines in a file
head	show first few lines of a file
tail	show last few lines of a file
find	find files that match certain criteria

LINUX It began in 1991 when programmer Linus Torvalds, a graduate student in Finland, posted his free Linux operating system on the Internet. Linux (pronounced "*linn*-uks") is the rising star of network software. ***Linux*** **is a free (nonproprietary) version of Unix, and its continual improvements result from the efforts of tens of thousands of volunteer programmers.** *(● See Panel 3.19.)* Whereas Windows Server is Microsoft's proprietary product, Linux is ***open-source software*****—meaning any programmer can download it from the Internet for free and modify it with suggested improvements.** The only qualification is that changes can't be copyrighted; they must be made available to all and remain in the public domain.

panel 3.19
Linux screen (Linux Mint)



Linux is available with a command-line interface or a GUI. It is used on a wide range of computers and devices, including mobile phones. It is a leading server operating system and runs some of the fastest supercomputers in the world.

- **Linux and China:** In 2000 the People's Republic of China announced that it was adopting Linux as a national standard for operating systems because it feared being dominated by the OS of a company of a foreign power—namely, Microsoft. In 2005 Red Flag Software Company, Ltd., the leading developer of Linux software in China, joined the Open Source Development Labs, a global consortium dedicated to accelerating the adoption of Linux in the business world. In 2007 OSDL and the Free Standards Group merged to form The Linux Foundation (*http://osdl.org/en/Main_Page*), narrowing their respective focuses to that of promoting Linux in competition with Microsoft Windows.
- **The permutations of Linux:** If Linux belongs to everyone, how do companies such as Red Hat Software—a company that bases its business on Linux—make money? Their strategy is to give away the software but then sell services and support. Red Hat, for example, makes available an inexpensive application software package that offers word processing, spreadsheets, email support, and the like for users of its PC OS version. It also offers more powerful versions of its Linux OS for small and medium-size businesses, along with applications, networking capabilities, and support services.
- **Google Chrome and Android:** In late 2008 Google launched its Chrome Internet browser. Based on Linux, this browser is intended for people who do most of their computer activities on the web. However, most of the operating systems that computers run on were designed in an era when there was no web; so in July 2009 Google introduced the Chrome OS. This operating system is a lightweight, open-source Linux-based system with a new windowing arrangement that has initially been targeted at netbooks. The user interface is minimal, and Internet connection is fast and secure. As with Chrome, this OS has been created for people who spend most of their computer time on the web. Chrome does not support Microsoft Office, which will limit its usability in business, educational, and professional environments, but it does support OpenOffice, Google email, Google Docs, and cloud computing. Also, Google has developed the Linux-based Android OS for mobile phones and netbooks.
- **Ubuntu & Debian:** Dell Computers offers a Linux-based operating system, Ubuntu (the Zulu word for "humanity"), on some of its products. The Debian Project is an association of individuals who created the free operating system called Debian GNU/Linux, or simply Debian for short. Debian comes with over 29,000 applications—all of it free. Debian will run on almost all personal computers, including most older models; it is used by a wide range of organizations, large and small, as well as many thousands of individuals.
- **Linux in the future:** Because it was originally built for use on the Internet, Linux is more reliable than Windows for online applications. Hence, it is better suited to run websites and e-commerce software. Its real growth, however, may come as it reaches outward to other applications and, possibly, replaces Windows in many situations. IBM, Red Hat, Motorola Computing, Panasonic, Sony, and many other companies have formed the nonprofit, vendor-neutral Embedded Linux Consortium, which now, as part of The Linux Foundation, is working to make Linux a top operating system of choice for developers designing embedded systems, as we discuss next.

The three major microcomputer operating systems are compared in the box on the next page. *(● See Panel 3.20.)*

more info!

China's Red Flag

To learn more about China's Red Flag Software Company, go to:

www.redflag-linux.com/en/

http://en.wikipedia.org/wiki/Red_Flag_Linux

more info!

Chrome

For a video on how Google Chrome OS works, go to:

www.youtube.com/watch?v=0QRO3gKj3qw

more info!

More on OS Comparisons

For more details on OS comparisons, go to:

www.operating-system.org/

www.pcmag.com/category2/0,2806,2362,00.asp

panel 3.20
Brief OS comparison

Windows	Linux	Mac OS X
Pros:	*Pros:*	*Pros:*
Runs on a wide range of hardware	Is very stable and can be easily updated.	Easy to install
Has largest market share	Runs on a wide range of hardware	Best GUI
Has many built-in utilities	Has largest number of user interface types	Secure and stable
Cons:	Can be used as server or desktop PC open source software; anyone can fix bugs	*Cons:* Fewer applications are available for the Mac than for Windows.
Security problems	*Cons:*	Base hardware more expensive than other platforms
Not efficient used as a server OS	Limited support for games	Fewer utilities available
Have to reboot every time a network configuration is changed	Limited commercial applications available	Fewer games than for Windows
Proprietary software; only company programmers can fix bugs	Can be difficult to learn	Proprietary software; only company programmers can fix bugs

more info!

Rules for Upgrading Your Operating System

http://blog.macsales.com/1411-the-golden-rules-of-upgrading-tips-from-the-owc-technical-support-team

www.youtube.com/watch?v=T2xnLpuAyCE

www.ehow.com/how_2157557_upgrade-computers-operating-system.html

more info!

Embedded Systems

For updates on smartphone OSs try:

www.palm.com/us/products/phones/

www.android.com/

www.apple.com/ios/

http://us.blackberry.com/apps-software/blackberry6/

www.symbianos.org/intro

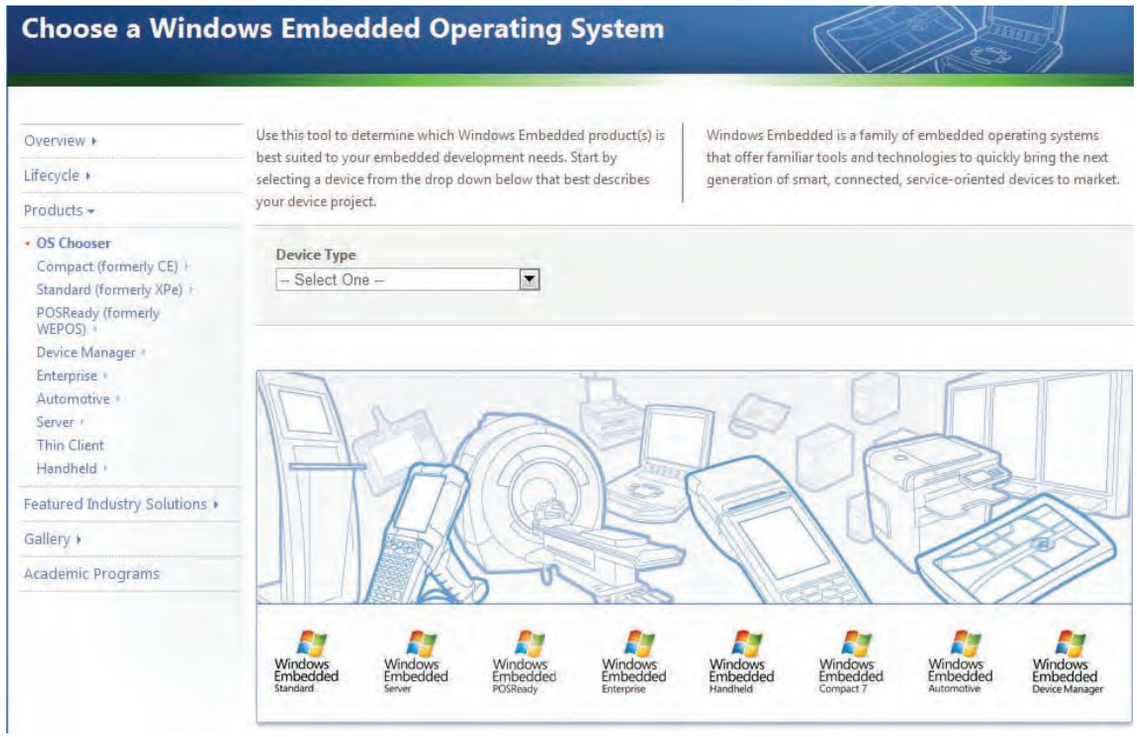
http://windows.microsoft.com/en-US/windows/products/windows-phone

Embedded Operating Systems for Handhelds

In general, embedded operating systems are used in small or specialized devices.

An ***embedded system*** (also called a real-time operating system) **is any electronic system that uses a CPU chip but that is not a general-purpose workstation, desktop, or laptop computer. It is a specialized computer system that is part of a larger system or a machine.** Embedded systems are used, for example, in automobiles, planes, trains, toasters, coffee machines, traffic lights, barcode scanners, fuel pumps, space vehicles, machine tools, watches, appliances, cellphones, MP3 players, PDAs, high-definition TV, and robots. Handheld computers and personal digital assistants also rely on specialized operating systems. Such operating systems include Android, Symbian, Apple iPhone, Windows Phone, BlackBerry OS, Palm OS, Embedded Linux, and many others.

Droid Pro, Apple iPhone, and LG Fathom Windows phone


Choose a Windows Embedded Operating System
Overview
Lifecycle
Products
OS Chooser
Compact (formerly CE)
Standard (formerly XPe)
POSReady (formerly WEPOS)
Device Manager
Enterprise
Automotive
Server
Thin Client
Handheld
Featured Industry Solutions
Gallery
Academic Programs
Use this tool to determine which Windows Embedded product(s) is best suited to your embedded development needs. Start by selecting a device from the drop down below that best describes your device project.
Windows Embedded is a family of embedded operating systems that offer familiar tools and technologies to quickly bring the next generation of smart, connected, service-oriented devices to market.
Device Type
-- Select One --
Windows Embedded Standard
Windows Embedded Server
Windows Embedded POSReady
Windows Embedded Enterprise
Windows Embedded Handheld
Windows Embedded Compact 7
Windows Embedded Automotive
Windows Embedded Device Manager

3.6 APPLICATION SOFTWARE: Getting Started

Application software comprises the programs that do the work that users are directly interested in.

Application software is designed to enable users to accomplish specific tasks—whether related to serious work or to entertainment. But before we discuss some of the common types of application software, we cover the ways to obtain application software—issues of licensure.

For Sale, For Free, or For Rent?

Software licensing protects the copyright by placing restrictions on the user.

Although most people pay for application software—popular brands that they can use with similar programs owned by their friends and coworkers—it's possible to rent programs or get them free. *(● See Panel 3.21.)* Let's consider these categories.

COMMERCIAL SOFTWARE *Commercial software,* also called *proprietary software* or *packaged software,* is software that's offered for sale, such as Microsoft Word, Microsoft Office, or Adobe PhotoShop. Although some such software

Types	Definition
Commercial software	Copyrighted. If you don't pay for it, you can be prosecuted.
Public-domain software	Not copyrighted. You can copy it for free without fear of prosecution.
Shareware	Copyrighted. Available free, but you should pay to continue using it.
Freeware	Copyrighted. Available free.
Rentalware	Copyrighted. Lease for a fee.

panel 3.21
Choices among application software

may have been preinstalled on your new PC and may not show up on the bill of sale when you buy it, you've paid for it as part of the purchase. And, most likely, whenever you order a new game or other commercial program, you'll have to pay for it. This software is copyrighted. A *copyright* is the exclusive legal right that prohibits copying of intellectual property without the permission of the copyright holder.

Software manufacturers don't sell you their software; rather, they sell you a license to become an authorized user of it. What's the difference? In paying for a ***software license*, you sign a contract in which you agree not to make copies of the software to give away or resell.** That is, you have bought only the company's permission to use the software and not the software itself. This legal nicety allows the company to retain its rights to the program and limits the way its customers can use it. The small print in the licensing agreement usually allows you to make one copy *(backup copy* or *archival copy)* for your own use. (Each software company has a different license; there is no industry standard.)

Several types of software licenses exist:

- *Site licenses* allow the software to be used on all computers at a specific location.
- *Concurrent-use licenses* allow a certain number of copies of the software to be used at the same time.
- *A multiple-user license* specifies the number of people who may use the software.
- *A single-user license* limits software use to one user at a time.

Important: Use of the enclosed software is subject to the license agreement included on this CD-ROM. You must read and agree to these terms and conditions before using the software. Any other use, copying, or distribution of the software is strictly prohibited.

Part of a software license

Most personal computer software licenses allow you to run the program on only one to three personal machines and make copies of the software only for personal backup purposes. If you buy software in shrink-wrapped packages, once you have opened the shrink-wrap, you have accepted the terms of the software license. When you download software, you will be required to check boxes next to licensure statements, indicating that you have accepted the licensing conditions.

Every year or so, software developers find ways to enhance their products and put forth new versions or new releases. A *version* is a major upgrade in a software product, traditionally indicated by numbers such as 1.0, 2.0, 3.0—for example, Adobe 9.0 and Adobe 10.0. More recently, other notations have been used. After 1995 Microsoft labeled its Windows and Office software versions by year instead of by number, as in Microsoft's Office 2000, Office 2003, Office 2007, and Office 2010. A *release,* which now may be called an "add" or "addition," is a minor upgrade. Often this is indicated by a change in number after the decimal point. (For instance, 8.0 may become 8.1, 8.2, and so on.) Some releases are now also indicated by the year in which they are marketed. And, unfortunately, some releases are not clearly indicated at all. (These are "patches," which may be downloaded from the software maker's website, as can version updates.) Once you have purchased an application, the manufacturer will usually allow you to download small patches for free but will charge for major new versions.

more info!

For information on public domain software and where to obtain it, go to:

www.gnu.org/philosophy/categories.html

www.webcrawler.com/webcrawler301/ws/results/web/public+domain+software/1/417/topnavigation/relevance/iq=true/zoom=off/_iceurlflag=7?_iceurl=true&gclid=ckik1ifjspscfrwdagodtafvpa

More recently, Apple Inc. has enjoyed huge success with its online App Store, offering more than 350,000 downloadable applications ("apps") for the iPhone, iPad, and iPod and more than 1,000 applications for the Mac computer. Other "stores" offering downloadable applications are BlackBerry App World, Google Android Market, Palm OS Apps Store, and Microsoft's Windows Phone.

PUBLIC-DOMAIN SOFTWARE ***Public-domain software*** **is not protected by copyright and thus may be duplicated by anyone at will.** Public-domain programs—sometimes developed by government agencies or universities—have

been donated to the public by their creators. They are often available through sites on the Internet. You can download and duplicate public-domain software without fear of legal prosecution.

SHAREWARE ***Shareware*** **is copyrighted software that is distributed free of charge, but users are required to make a monetary contribution, or pay a registration fee, to continue using it**—in other words, you can try it before you buy it. Once you pay the fee, you usually get supporting documentation, access to updated versions, and perhaps some technical support. Shareware is distributed primarily through the Internet, but because it is copyrighted, you cannot use it to develop your own program that would compete with the original product. If you copy shareware and pass it along to friends, they are expected to pay the registration fee also, if they choose to use the software.

FREEWARE ***Freeware*** **is copyrighted software that is distributed free of charge,** today most often over the Internet. Why would any software creator let his or her product go for free? Sometimes developers want to see how users respond, so that they can make improvements in a later version. Sometimes they want to further some scholarly or humanitarian purpose—for instance, to create a standard for software on which people are apt to agree. In its most recent form, freeware is made available by companies trying to make money some other way—actually, by attracting viewers to their advertising. (The web browsers Internet Explorer and Mozilla Firefox are of this type.) Freeware developers generally retain all rights to their programs; technically, you are not supposed to duplicate and redistribute the programs. (Freeware is different from free software, or public-domain software, which has no restrictions on use, modification, or redistribution.)

more info!

Shareware & Freeware

What kinds of shareware and freeware are available? To find out, go to:

www.searchalot.com/?p=&q=shareware
www.searchalot.com/?p=&q=freeware
www.shareware.com
www.tucows.com
www.freewarehome.com
www.download.com

RENTALWARE: ONLINE SOFTWARE ***Rentalware*** **is online software that users lease for a fee and download whenever they want it.** This is the concept behind *application service providers (ASPs),* or *software-as-a-service (SaaS) technology,* the idea of leasing software over the Internet. The ASP stores the software on its servers and supplies users with support and other services. Today online software accounts for only a small part of business-software sales, but it could represent the wave of the future, because it frees businesses from having to buy computer servers and hire a staff to maintain them. Some business owners find that present-day online software isn't as good as the traditional software available. However, online software represents a stage in what in Chapter 1 we called "cloud computing," the idea of obtaining computing resources from the network of computers sitting beyond a user's own four walls.[4] Some experts believe that future software is more apt to be available in a variety of ways: through traditional licensing, through online rentalware, through ad-supported online means, and even through open-source means.

more info!

More about ASPs

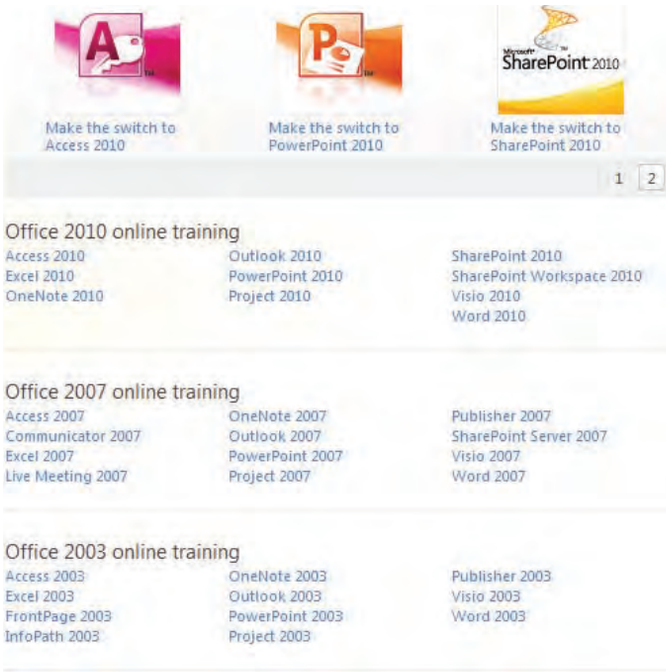
If you want to learn more about ASPs, go to:

www.aspnews.com
www.business.com/directory/internet_and_online/application_service_providers_asps/
http://dir.yahoo.com/business_and_economy/business_to_business/communications_and_networking/internet_and_world_wide_web/application_service_providers__asps_/

PIRATED SOFTWARE ***Pirated software*** **is software obtained illegally,** as when you get a CD/DVD from a friend who has made an illicit copy of, say, a commercial video game. Sometimes pirated software can be downloaded off the Internet. Sometimes it is sold in retail outlets in foreign countries. If you buy such software, not only do the original copyright owners not get paid for their creative work, but you risk getting inferior goods and, worse, picking up a virus. To discourage software piracy, many software manufacturers, such as Microsoft, require that users register their software when they install it on their computers. If the software is not registered, it will not work properly.

ABANDONWARE "Abandonware" does not refer to a way to obtain software. It refers to software that is no longer being sold or supported by its publisher. U.S. copyright laws state that copyrights owned by corporations are valid for up to 95 years from the date the software was first published. Copyrights are

not considered abandoned even if they are no longer enforced. Therefore, abandoned software does not enter the public domain just because it is no longer supported. Don't copy it.



Tutorial: Microsoft Office training for versions 2010, 2007, and 2003

CUSTOM SOFTWARE Occasionally companies or individuals need software written specifically for them, to meet unique needs. This software is called *custom software,* and it's created by software engineers and programmers.

Tutorials & Documentation

Application software documentation is the same as a user's manual; tutorials, often on video, take you through practice learning sessions.

How are you going to learn a given software program? Most commercial packages come with tutorials and documentation.

TUTORIALS A *tutorial* is an instruction book or program that helps you learn to use the product by taking you through a prescribed series of steps. For instance, our publisher offers several how-to books that enable you to learn different kinds of software. Tutorials may also be included in the software package.

DOCUMENTATION *Documentation* is all information that describes a product to users, including a user guide or reference manual that provides a narrative and graphical description of a program. Although documentation may be print-based, today it is usually available on CD, as well as downloaded from the Internet. Documentation may be instructional, but features and functions are usually grouped by category for reference purposes. For example, in word processing documentation, all features related to printing are grouped together so that you can easily look them up.

more info!

For information on new and unusual software applications and where to obtain them, go to:

www.appscout.com/about_appscout/

A Few Facts about Files & the Usefulness of Importing & Exporting

Program files contain software instructions that process data; data files contain the data that program files use. There are several types of data files—three common ones are document, spreadsheet, and database files—and you will often have to import and export them.

Before we discuss some of the commonly used application software types, we need to briefly discuss file types. (A bit more detail is given at the end of the chapter, in Section 3.11.)

There is only one reason for having application software: to take raw data and manipulate it into useful files of information. A *file,* as we said earlier, is (1) a program (program file) (p. 124) that exists in a computer's secondary storage, such as hard disk, flash drive, or CD/DVD, or (2) a named collection of data (data file).

Program files **are files containing excutable software instructions.** Examples are word processing or spreadsheet programs, which are made up of several different program files. The two most important are source program files and executable files.

Source program files contain high-level computer instructions in the original form written by the programmer. Some source program files have the extension of the language in which they are written, such as *.bas* for BASIC, *.pas* for Pascal, or *.jav* for Java.

For the processor to use source program instructions, they must be translated into an *executable file*, which contains the instructions that tell the computer how to perform a particular task. You can identify an executable file by its extension, *.exe* or *.com*. You use an executable file by running it—as when you select Microsoft Excel from your on-screen menu and run it. (There are some executable files, called *runtime libraries*, that you cannot run—other programs cause them to execute. These are identified by such extensions as *.dll* [dynamic link library], *.drv* [*driver file*], *.ocx* [*object control extension*], *.sys* [*system file*], and *.vbx* [*Visual Basic extension*].) (Extensions are covered in more detail at the end of the chapter.)

Data files **are files that contain data—**words, numbers, pictures, sounds, and so on. Unlike program files, data files don't instruct the computer to do anything. Rather, data files are there to be acted on by program files. Some data files are readable only by the software application that created them, whereas other data files (such as *.txt*, or "text," files) can be accessed by many different software applications.

THREE TYPES OF DATA FILES Three well-known types of data files are these:

- **Document files:** Document files are created by word processing programs and consist of documents such as reports, letters, memos, and term papers. (For example, *.doc* and *.docx* files are created by Microsoft Word.)
- **Workbook files:** Workbook files are created by electronic spreadsheets and usually consist of collections of numerical data such as budgets, sales forecasts, and schedules. (For instance, *.xls* files are created by Microsoft Excel spreadsheet software.)
- **Database files:** Database files are created by database management programs and consist of organized data that can be analyzed and displayed in various useful ways. Examples are student names and addresses that can be displayed according to age, grade-point average, or home state. (For example, *.mdb* files are created by Microsoft Access.)

EXCHANGING FILES: IMPORTING & EXPORTING It's useful to know that often files can be exchanged—that is, imported and exported—between programs.

- **Importing:** ***Importing*** **is defined as getting data from another source and then converting it into a format compatible with the program in which you are currently working.** For example, you might write a letter in your word processing program and include in it—that is, import—a column of numbers from your spreadsheet program. The ability to import data is very important in software applications because it means that one application can complement another.
- **Exporting:** ***Exporting*** **is defined as transforming data into a format that can be used in another program and then transmitting it.** For example, you might work up a list of names and addresses in your database program and then send it—export it—to a document you wrote in your word processing program. Exporting implies that the sending application reformats the data for the receiving application; importing implies that the receiving application does the reformatting.

Types of Application Software

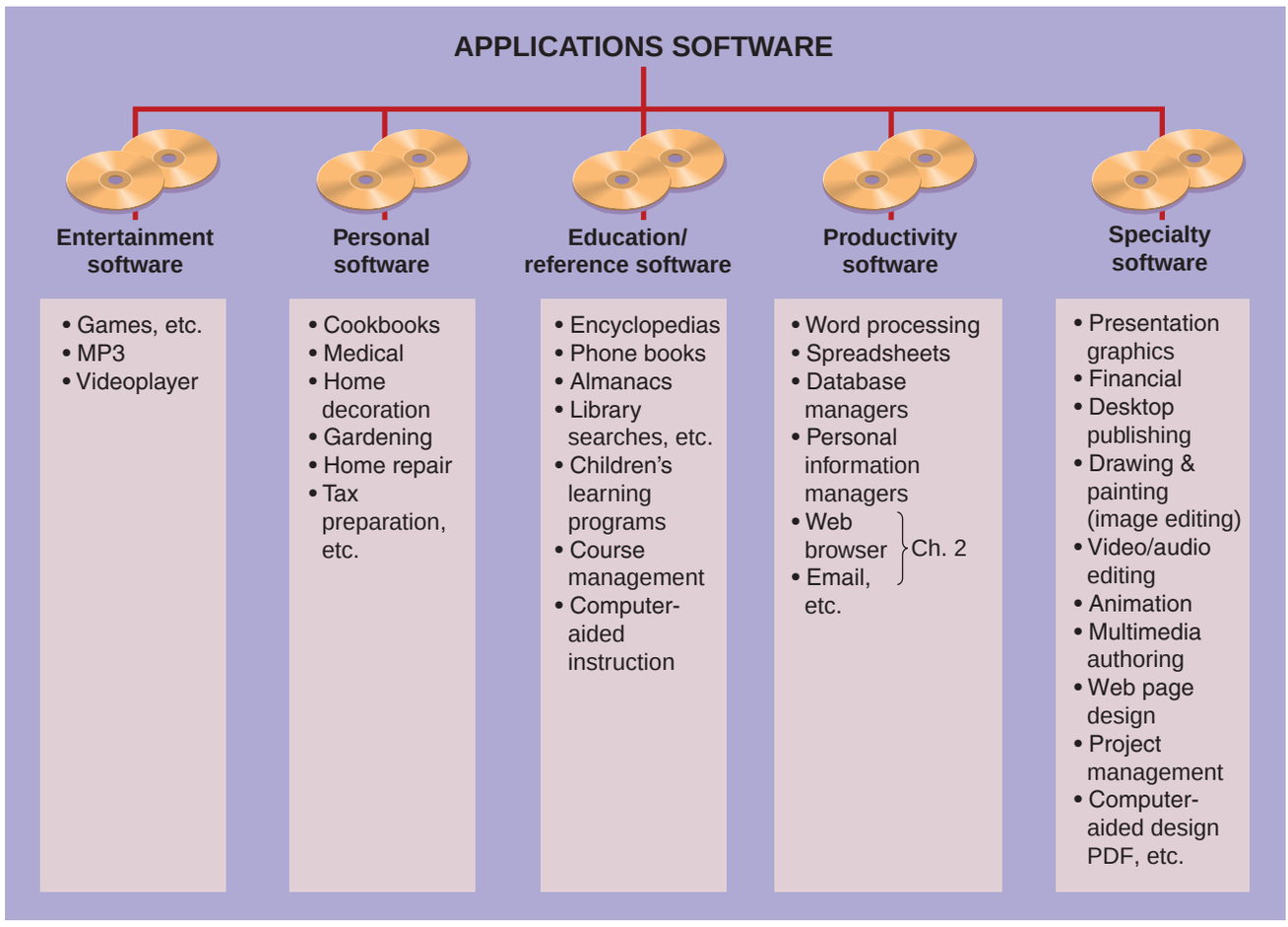
There are many types of application software; productivity software is the type used in business and in many educational situations.

Application software can be classified in many ways—for entertainment, personal, education/reference, productivity, and specialized uses. *(● See Panel 3.22.)*

In the rest of this chapter we discuss types of ***productivity software*—such as word processing programs, spreadsheets, and database managers—whose purpose is to make users more productive at particular tasks.** Some productivity software comes in the form of an *office suite,* which bundles several applications together into a single large package. Microsoft Office, for example, includes (among other things) Word, Excel, PowerPoint, and Access—word processing, spreadsheet, presentation, and database programs, respectively. (Office is available for both the PC and the Mac platforms.) Corel Corp. offers similar programs, such as the WordPerfect word processing program. Other productivity software, such as Lotus Notes, is sold as *groupware*—online software that allows several people to collaborate on the same project and share some resources. Google offers a free suite of applications called Google Apps (from *www.google.com/apps)*.

Note that all these types of programs must be *installed* on your computer before you can use them. For example, if you buy Microsoft Office, you need to install it on your computer before you can run any of the included programs such as Word or Excel. You can install software from a CD or DVD, an external hard drive, or a networked computer, or install a downloaded version from the Internet.

panel 3.22
Some types of application software



Installing a software program writes the necessary data instructions for running the program on your hard drive. Often the installer program will decompress the data included with the installer immediately before writing the information to your hard drive. Software updates, which are typically downloaded from the Internet, work the same way. When you run the update, the installer file decompresses the data and then updates the correct program.

Installing software is usually a simple process. It involves double-clicking an installer icon and then clicking "I Agree" when the license agreement displays. You may have to choose what directory on your hard disk you would like to install the software in, but often the installer will choose that for you. A *clean install* is a software installation in which any previous version is erased. The alternative to a clean install is an *upgrade*, in which elements of the previous version remain and new elements are added. An upgrade is typically less expensive, but because some elements of the earlier version remain, any existing problems may remain as well, and new compatibility-related issues may arise. A clean install should make the computer's software run like new.

We now consider the three most important types of productivity software: word processing, spreadsheet, and database software (including personal information managers). We then discuss more specialized software: presentation graphics, financial, desktop-publishing, drawing and painting, project management, computer-aided design, web page design, image/video/audio editing, and animation software.

more info!

Software Installation Basics

http://windows.microsoft.com/en-US/windows-vista/Install-a-program

www.installsoftware.com/

http://support.apple.com/kb/HT1148

OpenOffice.org
Why OpenOffice.org
Why
Great Software
Easy to use
and it's free
Great Software...
... Easy to Use ...
... and it's Free!
OpenOffice.org
OpenOffice.org 3 is the leading open-source office software suite for word processing, spreadsheets, presentations, graphics, databases and more. It is available in many languages and works on all common computers. It stores all your data in an international open standard format and can also read and write files from other common office software packages. It can be downloaded and used completely free of charge for any purpose.
Get OpenOffice.org 3 now
Governments
Education
Businesses
Not for profits
IT Businesses
F/OSS advocates
Great software
OpenOffice.org 3 is the result of over twenty years' software engineering. Designed from the start as a single piece of software, it has a consistency other products cannot match. A completely open development process means that anyone can report bugs, request new features, or enhance the software. The result: OpenOffice.org 3 does everything you want your office software to do, the way you
Easy to use
OpenOffice.org 3 is easy to learn, and if you're already using another office software package, you'll take to OpenOffice.org 3 straight away. Our world-wide native-language community means that OpenOffice.org 3 is probably available and supported in your own language. And if you already have files from another office package - OpenOffice.org 3 will probably read them with no difficulty.
and it's free
Best of all, OpenOffice.org 3 can be downloaded and used entirely free of any licence fees. OpenOffice.org 3 is released under the LGPL licence. This means you may use it for any purpose - domestic, commercial, educational, public administration. You may install it on as many computers as you like. You may make copies and give them away to family, friends, students, employees - anyone you like.

more info!

OpenOffice

Commercial Office suites are fairly expensive—but there is a free alternative, available for a number of different OSs: OpenOffice.org (*www.openoffice.org*). It can read most other file formats, including Microsoft Office, and it has most of the same features as MS Office.

3.7 Word Processing Software

Word processing mostly involves the creation of text documents.

Word processing software **allows you to use computers to create, edit, format, print, and store text material,** among other things. Word processing is the most common software application. The best-known word processing program is Microsoft Word, but there are others, such as Corel WordPerfect, Apple iWork Pages, Google Apps (a free download from *www.google.com/apps),* and Zoho Writer (a free download from *www.zoho.com*). There is even a full-fledged office suite for word processing, known as Quickoffice, that can be used on Android phones, Apple iPhones, BlackBerries, and Symbian OS devices. Word processing software allows users to work through a document and *delete, insert,* and *replace* text, the principal edit/correction activities. It also offers such additional features as *creating, formatting, printing,* and *saving.*

Of course, creating a document means entering text using the keyboard or the dictation function associated with speech-recognition software. Word processing software has three features that affect this process—the *cursor, scrolling,* and *word wrap*.

CURSOR **The *cursor* is the movable symbol on the display screen that shows you where you may next enter data or commands.** The symbol is often a blinking rectangle or an I-beam. You can move the cursor on the screen using the keyboard's directional arrow keys or a mouse. The point where the cursor is located is called the *insertion point*.

SCROLLING ***Scrolling*** **means moving quickly upward, downward, or sideways through the text or other screen display.** A standard computer screen displays only 20–22 lines of standard-size text. Of course, most documents are longer than that. Using the directional arrow keys, or the mouse and a scroll bar located at the side of the screen, you can move ("scroll") through the display screen and into the text above and below it.

Scrolling

WORD WRAP ***Word wrap*** **automatically continues text to the next line when you reach the right margin.** That is, the text "wraps around" to the next line. You don't have to hit a "carriage-return" key or Enter key, as was necessary with a typewriter.

SOME OTHER FEATURES To help you organize term papers and reports, the *Outline View* feature puts tags on various headings to show the hierarchy of heads—for example, main head, subhead, and sub-subhead. Word processing software also allows you to insert footnotes that are automatically numbered and renumbered when changes are made. The basics of word processing are shown in the accompanying illustration. *(● See Panel 3.23.)*

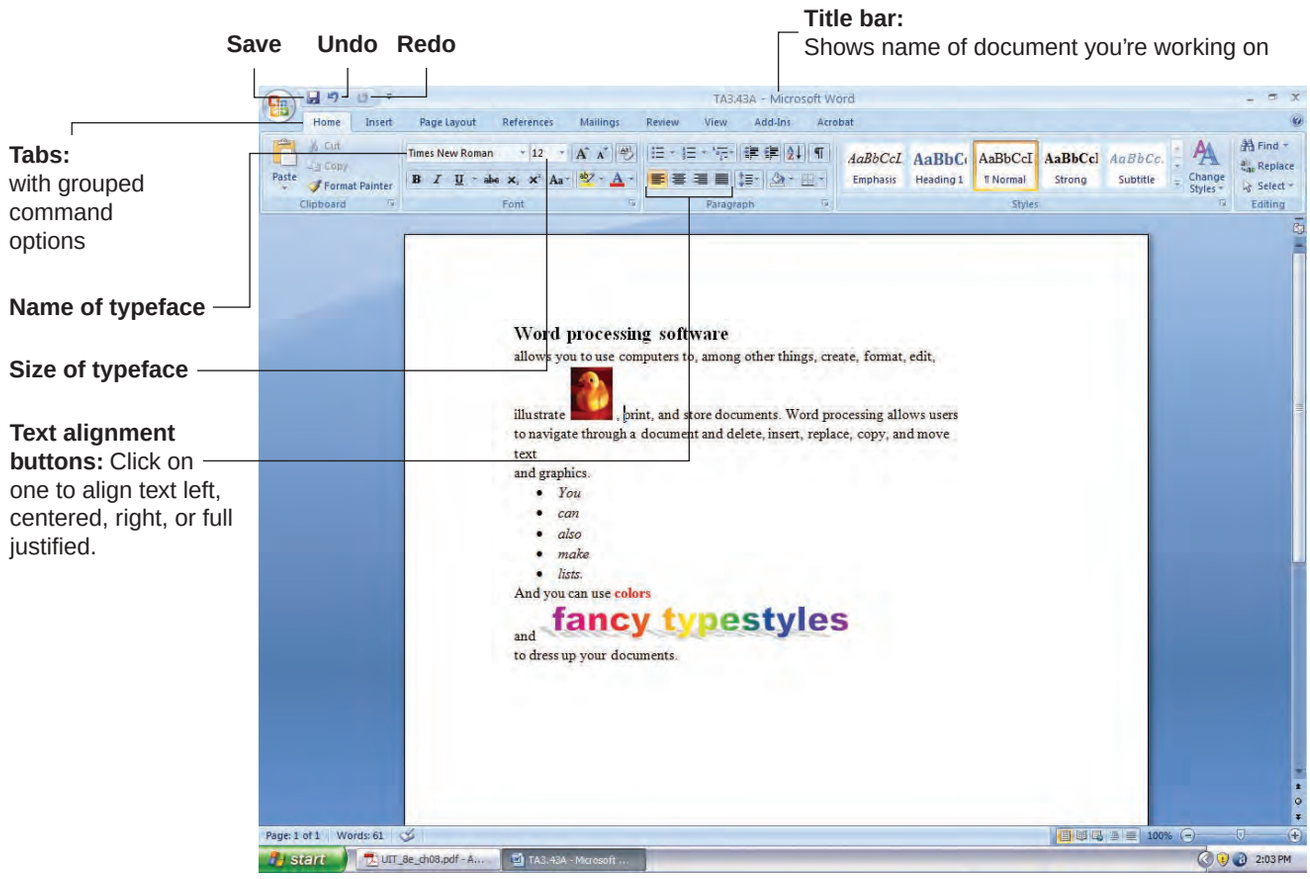
Editing is the act of making alterations in the content of your document. Some features of editing, as we will discuss briefly, are *insert* and *delete, undelete, find and replace, cut/copy and paste, spelling checker, grammar checker,* and *thesaurus*.

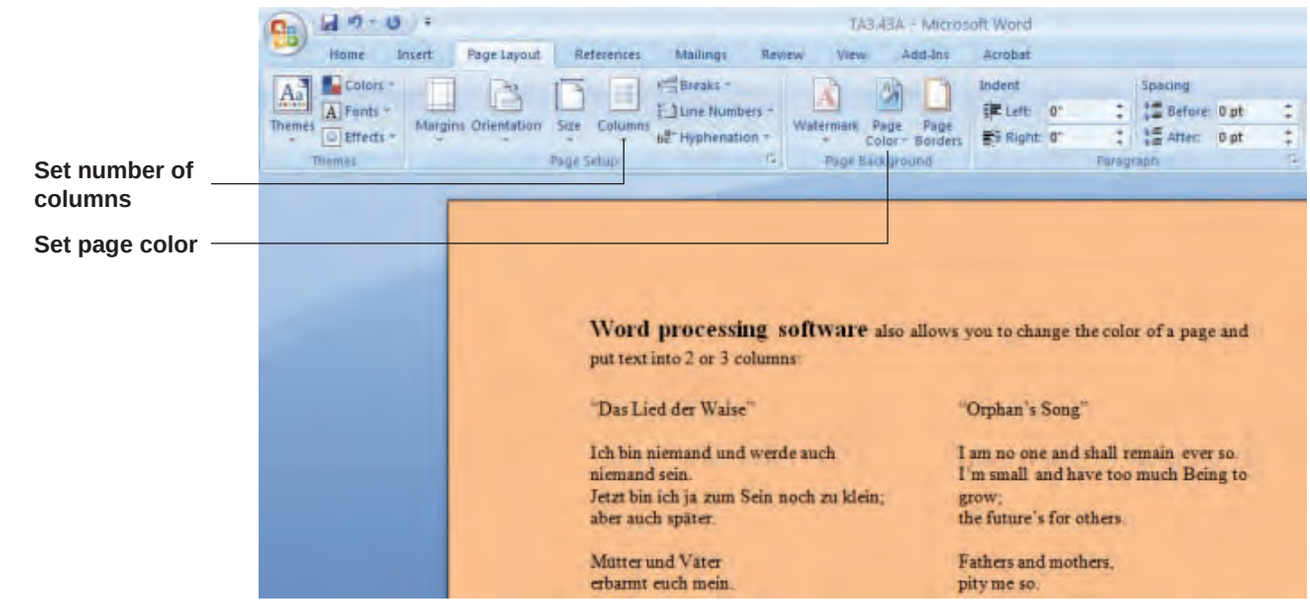
Inserting is the act of adding to the document. Simply place the cursor wherever you want to add text and start typing; the existing characters will be pushed along. If you want to write over (replace) text as you write, press the *Insert* key before typing. When you're finished typing, press the *Insert* key again to exit Insert mode.

Deleting is the act of removing text, usually using the *Delete* key or the *Backspace* key.

The *Undo command* allows you to change your mind and undo your last action (or several previous actions) and restore text that you have deleted.

The *Find,* or *Search, command* allows you to find any word, phrase, or number that exists in your document. The *Replace command* allows you to automatically replace it with something else.


Save
Undo
Redo
Title bar:
Shows name of document you're working on
Tabs:
with grouped command options
Name of typeface
Size of typeface
Text alignment buttons: Click on one to align text left, centered, right, or full justified.
TA3.43A - Microsoft Word
Word processing software
allows you to use computers to, among other things, create, format, edit,
illustrate
, print, and store documents. Word processing allows users to navigate through a document and delete, insert, replace, copy, and move text
and graphics.
You
can
also
make
lists.
And you can use colors
and
fancy typestyles
to dress up your documents.


Set number of columns
Set page color
TA3.43A - Microsoft Word
Word processing software also allows you to change the color of a page and put text into 2 or 3 columns.
"Das Lied der Waise"
Ich bin niemand und werde auch niemand sein.
Jetzt bin ich ja zum Sein noch zu klein;
aber auch später.
Mütter und Väter
erbarmt euch mein.
"Orphan's Song"
I am no one and shall remain ever so.
I'm small and have too much Being to grow;
the future's for others.
Fathers and mothers,
pity me so.

panel 3.23

Some word processing functions in Word 2007

Typewriter users who wanted to move a paragraph or block of text from one place to another in a manuscript used scissors and glue to "cut and paste." With word processing, moving text takes only a few keystrokes. You select (highlight with the mouse) the portion of text you want to copy or move. Then you use the *Copy* or *Cut command* to move it to the *clipboard,* a special holding area in the computer's memory. From there, you use *Paste* to transfer the material to any point (indicated with the cursor) in the existing document or in a new document. The clipboard retains its material, so repeated pastes of the same item will work without your having to recopy each time.

Most word processors have a *spelling checker,* which tests for incorrectly spelled words. As you type, the spelling checker indicates (perhaps with a squiggly line) words that aren't in its dictionary and thus may be misspelled. *(● See Panel 3.24.)* Special add-on dictionaries are available for medical, engineering, and legal terms.

In addition, programs such as Microsoft Word have an Auto Correct function that automatically fixes such common mistakes as transposed letters—replacing "teh" with "the," for instance.

A *grammar checker* highlights poor grammar, wordiness, incomplete sentences, and awkward phrases. The grammar checker won't fix things automatically, but it will flag (perhaps with a different-color squiggly line) possible incorrect word usage and sentence structure. *(● See Panel 3.25.)*

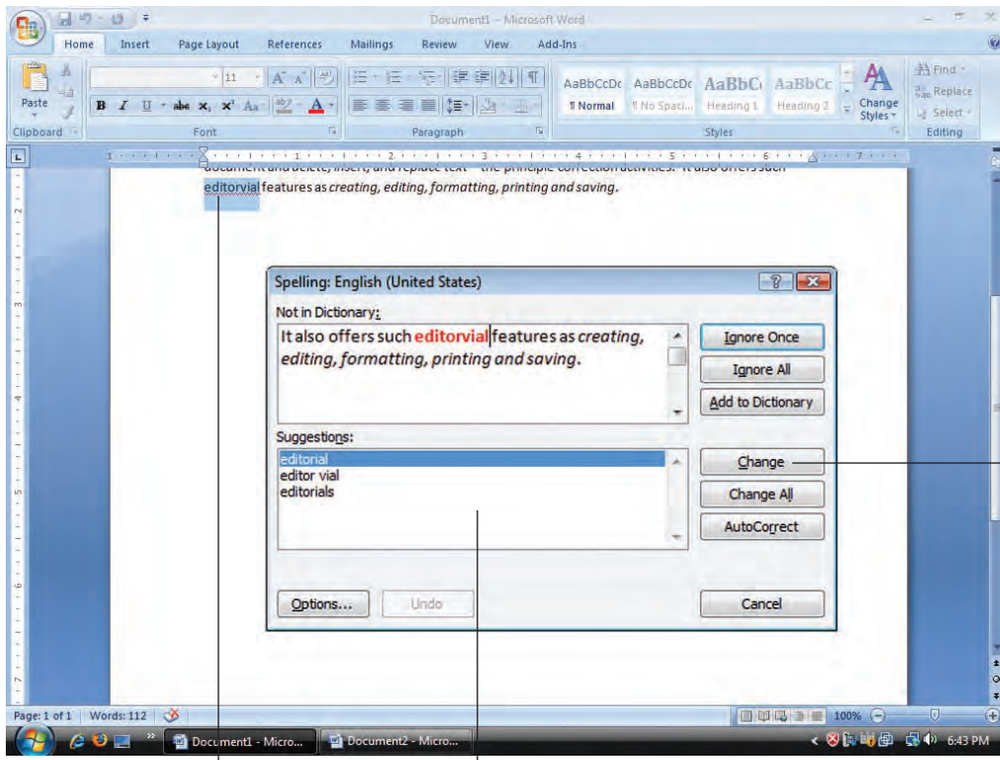
If you find yourself stuck for the right word while you're writing, you can call up an on-screen *thesaurus,* which will present you with the appropriate word or alternative words. You can also purchase more comprehensive thesaurus add-on programs, such as WordWeb55.

In the context of word processing, *formatting* means determining the appearance of a document. You can always format your documents manually, but word processing programs provide a helpful device to speed the process up and make it more sophisticated. **A *template* is a preformatted document that provides basic tools for shaping a final document**—the text, layout, and style for a letter, for example. Simply put, it is a style guide for documents. Because most documents are fairly standard in format, every word processing program comes with at least a few standard templates. When you use a template, you're actually opening a copy of the template. In this way you'll always have a fresh copy of the original template when you need it. After you open a copy of the template and add your text, you save this version of the template

panel 3.24

Spelling checker in Word 2007

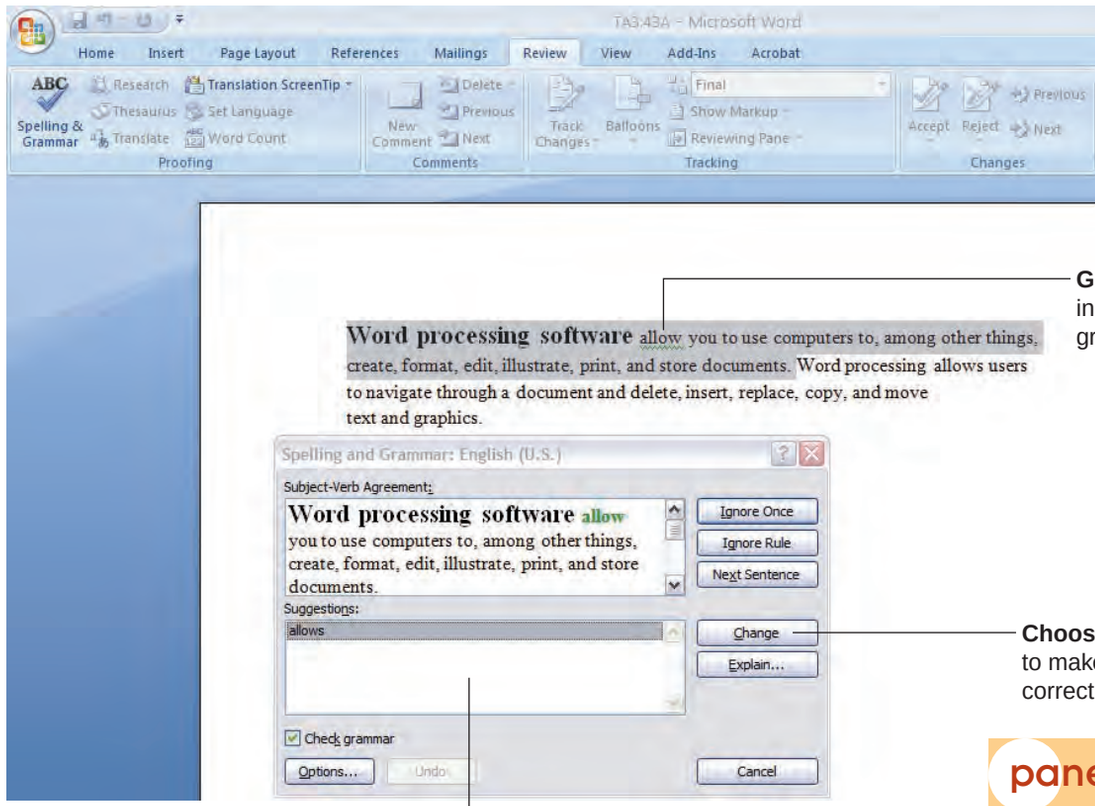
How a word processing program checks for misspelled words and offers alternatives.



Choose Change to insert the highlighted word.

Red wavy line
Indicates spelling checker doesn't recognize the word.

Dialog box
Suggests correct spellings.



Green wavy line indicates a possible grammar error.

Choose Change to make the suggested correction.

Dialog box suggests a correction.

panel 3.25

Grammar checker in Word 2007

This program points out possible errors in sentence structure and word usage and suggests alternatives.

under the filename of your choice. In this way, for example, in a letterhead template, your project's name, address, phone number, and web address are included every time you open your letterhead template file.

Among the many aspects of formatting are these:

- You can decide what *font*—typeface and type size—you wish to use. For instance, you can specify whether it should be Times Roman, Arial, or Courier. You can indicate whether the text should be, say, 10 points or 12 points in size and the headings should be 14 points or 16 points. (There are 72 points—6 picas—in an inch.) You can specify what parts should be underlined, *italic,* or **boldface.**

Fonts

10 point
Times Roman

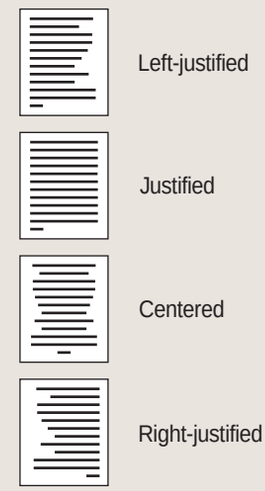
14 point Arial Black

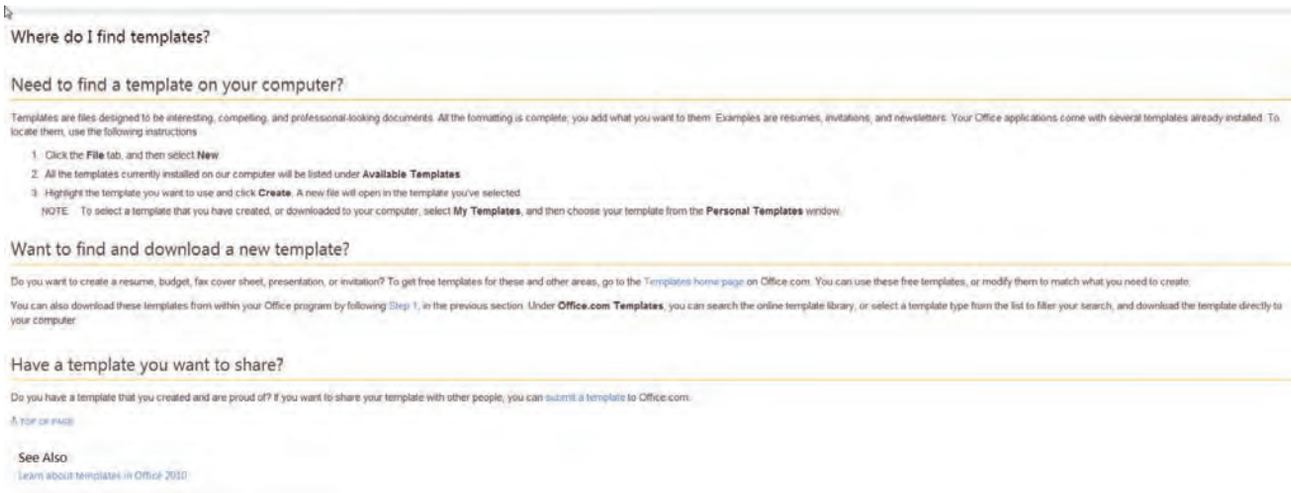
16 point Courier

60
(60 point Arial)

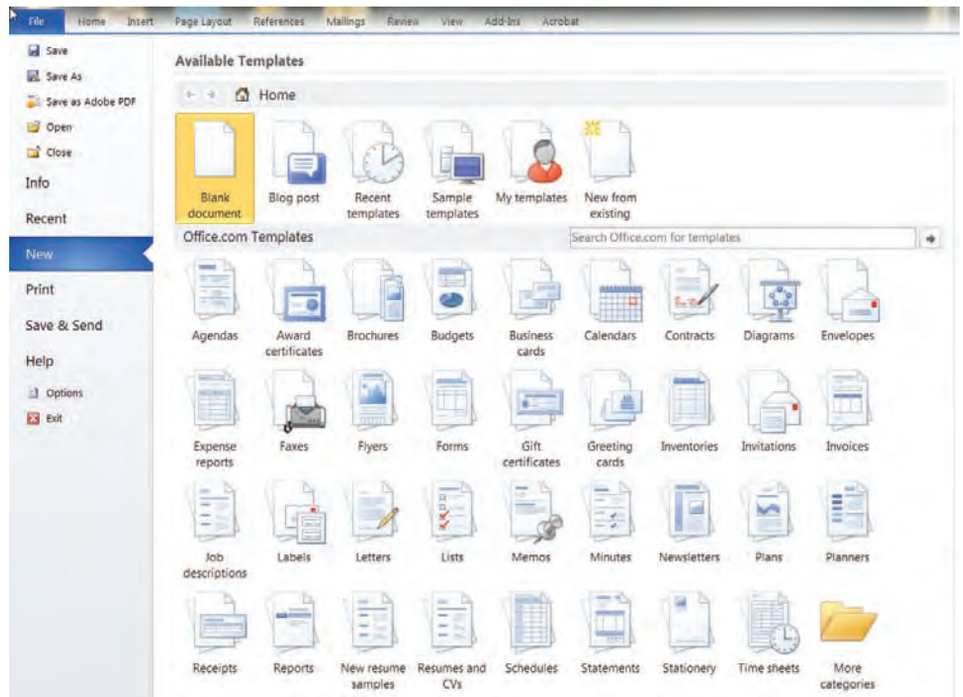
- You can choose whether you want the lines to be *single-spaced* or *double-spaced* (or something else). You can specify whether you want text to be *one column* (like this page), *two columns* (like many magazines and books), or *several columns* (like newspapers).
- You can indicate the dimensions of the margins—left, right, top, and bottom—around the text. You can specify the text *justification*—how the letters and words are spaced in each line. To *justify* means to align text evenly between left and right margins, as in most newspaper columns and the preceding two paragraphs. To *left-justify* means to align text evenly on the left. (Left-justified text has a "ragged-right" margin, as do many business letters and this paragraph.) *Centering* centers each text line in the available white space between the left and right margins.

Justification




Where do I find templates?
Need to find a template on your computer?
Templates are files designed to be interesting, compelling, and professional-looking documents. All the formatting is complete; you add what you want to them. Examples are resumes, invitations, and newsletters. Your Office applications come with several templates already installed. To locate them, use the following instructions:
1. Click the File tab, and then select New.
2. All the templates currently installed on our computer will be listed under Available Templates.
3. Highlight the template you want to use and click Create. A new file will open in the template you've selected.
NOTE: To select a template that you have created, or downloaded to your computer, select My Templates, and then choose your template from the Personal Templates window.
Want to find and download a new template?
Do you want to create a resume, budget, fax cover sheet, presentation, or invitation? To get free templates for these and other areas, go to the Templates home page on Office.com. You can use these free templates, or modify them to match what you need to create.
You can also download these templates from within your Office program by following Step 1, in the previous section. Under Office.com Templates, you can search the online template library, or select a template type from the list to filter your search, and download the template directly to your computer.
Have a template you want to share?
Do you have a template that you created and are proud of? If you want to share your template with other people, you can submit a template to Office.com.
See Also
Learn about templates in Office 2010

Word can help you choose templates.



Survival Tip

When Several Word Documents Are Open

You can write with several Word documents open simultaneously. To go ("toggle") back and forth, hold down *Ctrl* and press *F6*. To display several documents at once, go to the Windows menu (2003) or the View tab (2007, 2010) and select *Arrange All*. You can cut and paste text from one document to another.

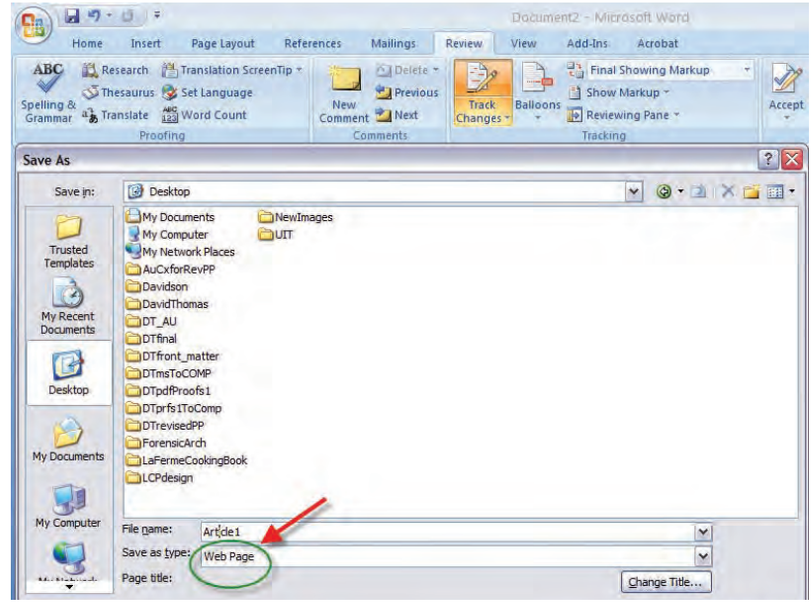
- You can indicate headers or footers and include page numbers. A *header* is common text (such as a date or document name) printed at the top of every page. A *footer* is the same thing printed at the bottom of every page. If you want page numbers, you can determine what number to start with, among other things.
- You can specify *borders* or other decorative lines, *shading, tables,* and *footnotes*. You can even import *graphics* or drawings from files in other software programs, including *clip art*—collections of ready-made pictures and illustrations available online or on CDs/DVDs.

Note that word processing programs (and indeed most forms of application software) come from the manufacturer with default settings. ***Default settings*** **are the settings automatically used by a program unless the user specifies otherwise, thereby overriding them.** Thus, for example, a word processing program may automatically prepare a document single-spaced,

left-justified, with 1-inch right and left margins, unless you alter these default settings.

Most word processing software gives you several options for printing. For example, you can print *several copies* of a document. You can print *individual pages* or a *range of pages*. You can even preview a document before printing it out. *Previewing (print previewing)* means viewing a document on-screen to see what it will look like in printed form before it's printed. Whole pages are displayed in reduced size.

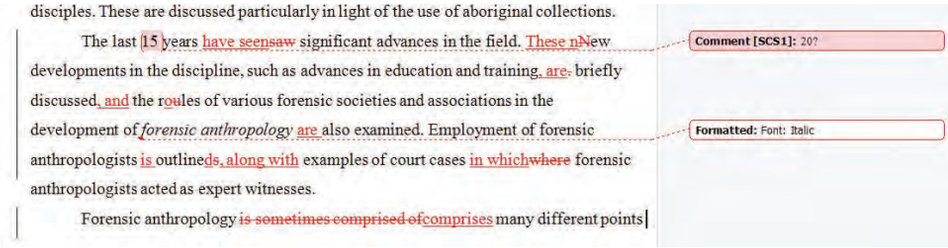
You can also send your document off to someone else by fax or email attachment if your computer has the appropriate communications link.



Saving a document as a web page in Word 2007

Of course, you must also be able to save your work. ***Saving*** **means storing, or preserving, a document as an electronic file permanently**—on your hard disk, a CD, or online. You need only retrieve the document from storage and make the changes you want. Then you can print it out or save it again—or email it. (*Always save your documents often while you are working; don't wait!*)

Most word processing programs allow you to automatically format your documents into HTML (p. 179) so that they can be used on the web. To do this in Microsoft Word, open *File, Save As, Save As Type: Web page (*.htm, *.html).*


disciples. These are discussed particularly in light of the use of aboriginal collections.

The last 15 years have seensaw significant advances in the field. These nNew developments in the discipline, such as advances in education and training, are, briefly discussed, and the roules of various forensic societies and associations in the development of *forensic anthropology* are also examined. Employment of forensic anthropologists is outlineds, along with examples of court cases in whichwhere forensic anthropologists acted as expert witnesses.

Forensic anthropology ~~is sometimes comprised of~~comprises many different points

Comment [SCS1]: 20?

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Tracking in Word 2010

Word processing programs also have *tracking* features. What if you have written an important document and have asked other people to edit it? Word processing software allows editing changes to be tracked by highlighting them, underlining additions, and crossing out deletions. Each person working on the document can choose a different color so that you can tell who's done what and when. An edited document can be printed out showing all the changes, as well as a list of comments keyed to the text by numbers. Or it can be printed out "clean," showing the edited text in its new form, without the changes.

3.8 Spreadsheet Programs

A spreadsheet program uses rectangular grids for laying out linked, usually financial, data in a very organized fashion.

What is a spreadsheet? Traditionally, it was simply a grid of rows and columns, printed on special light-green paper, that was used to produce financial projections and reports. A person making up a spreadsheet spent long days and weekends at the office penciling tiny numbers into countless tiny rectangles. When one figure changed, all other numbers on the spreadsheet had to be erased and recomputed. Ultimately, there might be wastebaskets full of jettisoned worksheets.

In 1978 Daniel Bricklin was a student at the Harvard Business School. One day he was staring at columns of numbers on a blackboard when he got the idea for computerizing the spreadsheet. He created the first electronic spreadsheet, now called simply a worksheet. **The *worksheet* allows users to create tables and financial schedules by entering data and formulas into rows and columns arranged as a grid on a display screen.** Before long the electronic spreadsheet was the most popular small business program. Unfortunately for Bricklin, his version (called VisiCalc) was quickly surpassed by others. Today the principal spreadsheet programs are Microsoft Excel, Corel Quattro Pro, Apple iWork Numbers, and IBM's Lotus 1-2-3. These programs are used for maintaining student grade books, tracking investments, creating and tracking budgets, calculating loan payments, estimating project costs, and creating other types of financial reports.

The Basics: How Spreadsheet Programs Work

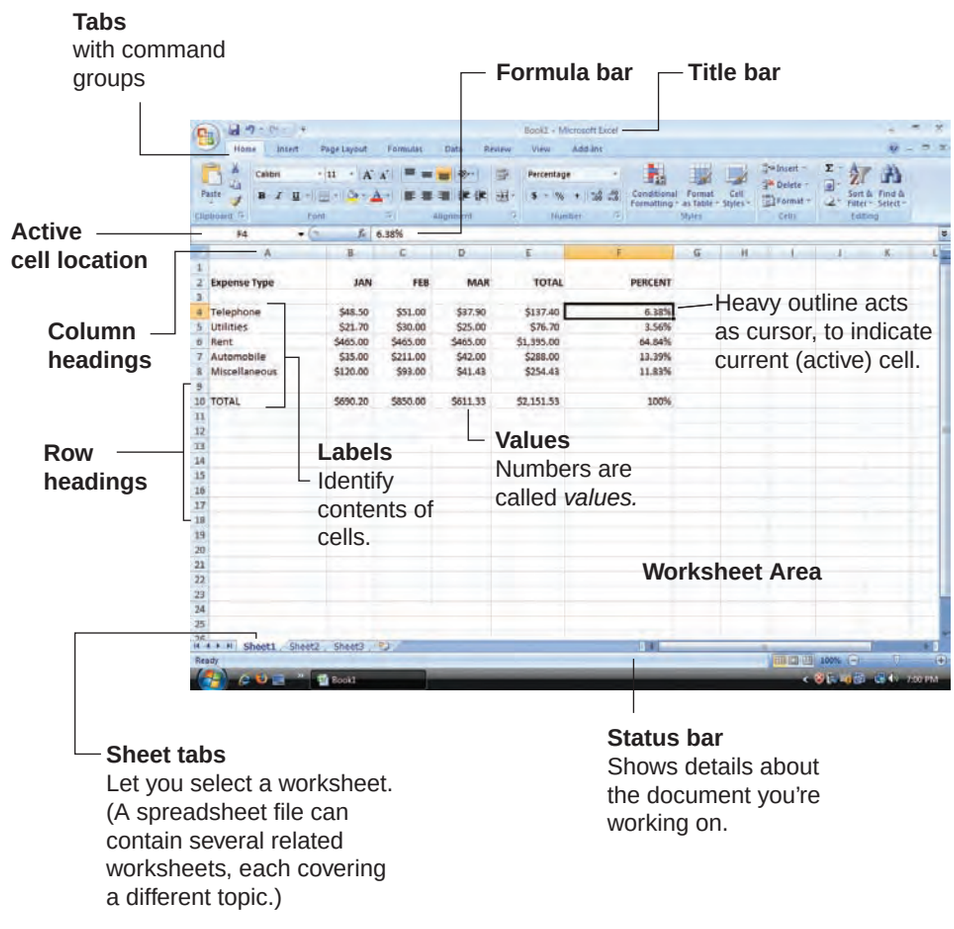
Spreadsheet programs provide tools for collecting and calculating data of all types. Beyond working with numerical data, worksheets can be formatted to create clear, concise reports and can be easily sorted and updated.

A worksheet is arranged as follows. *(● See Panel 3.26.)*

HOW A SPREADSHEET FILE IS ORGANIZED The word *spreadsheet* usually refers to the type of application program. A spreadsheet file is called a *workbook*. A workbook's grid arrangement of columns, rows, and labels is called a

panel 3.26

Spreadsheet program worksheet
This program is Microsoft Excel 2007.



worksheet. So, for example, when you open the Excel spreadsheet program, it loads an empty workbook file consisting of three blank worksheets for you to use. The worksheets have columns, rows, and labels:

- **Column headings:** In the worksheet's frame area (work area), lettered *column headings* appear across the top ("A" is the name of the first column, "B" the second, and so on).
- **Row headings:** Numbered *row headings* appear down the left side ("1" is the name of the first row, "2" the second, and so forth).
- **Labels:** *Labels* are any descriptive text that identifies categories, such as APRIL, RENT, or GROSS SALES.

Use your keyboard to type in the various headings and labels. Each Microsoft Office Excel worksheet has 16,384 columns and 1,048,576 rows, and each spreadsheet file (workbook) can technically hold up to 650 related worksheets—but the computer's memory (RAM, p. 31) will not likely hold more than about 200.

CELLS: WHERE COLUMNS & ROWS MEET Each worksheet has more than 17 million cells.

- **Cells & cell addresses:** **A *cell* is the place where a row and a column intersect; its position is called a *cell reference* or *cell address*.** For example, "A1" is the cell address for the top left cell, where column A and row 1 intersect. (The column letter is always listed first.)
- **Ranges:** **A *range* is a rectangular group of adjacent cells**—for example, B5 to D10. Ranges are identified by the cell references of the cells in the upper left and lower right corners of the range. The two cell references used for a range are separated by a colon (:), which tells Excel to include all the cells between these start and end points—B5:D10.
- **Values:** **A number or date entered in a cell is called a *value*.** The values are the actual numbers used in the spreadsheet—dollars, percentages, grade points, temperatures, or whatever. Headings, labels, and formulas also go into cells.
- **Cell pointer:** A *cell pointer,* or *spreadsheet cursor,* indicates where data is to be entered. The cell pointer can be moved around like a cursor in a word processing program.

more info!

How to Plan Worksheets

For a start on how to set up a worksheet, try:

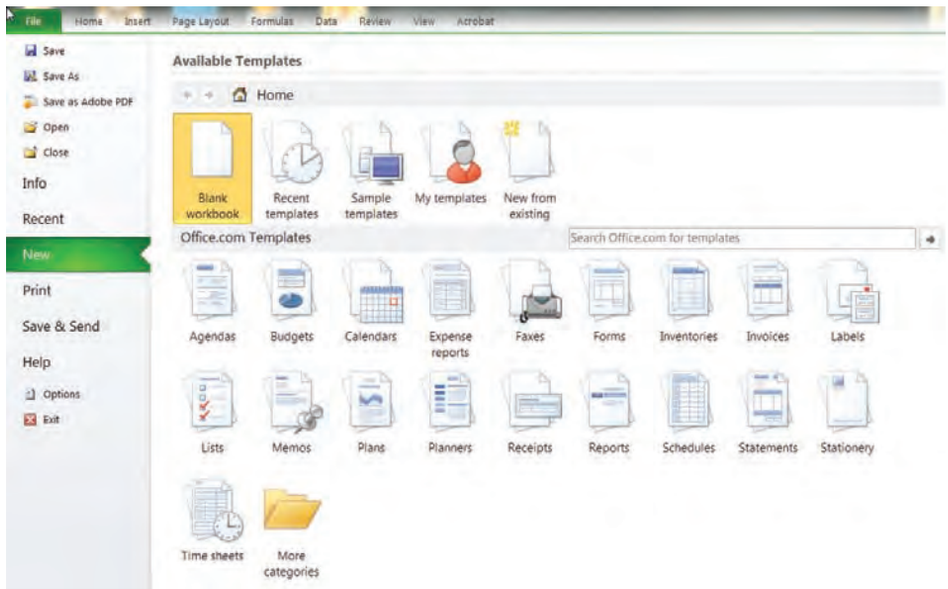
http://spreadsheets.about.com/od/excel101/ss/enter_data.htm

FORMULAS, FUNCTIONS, RECALCULATION, & WHAT-IF ANALYSIS Why has the spreadsheet program become so popular? The reasons lie in the features known as formulas, functions, recalculation, and what-if analysis.

- **Formulas:** ***Formulas*** **are instructions for calculations; they define how one cell relates to other cells.** For example, a formula might be =SUM(A5:A15) or @SUM(A5:A15), meaning "Sum (that is, add) all the numbers in the cells with cell addresses A5 through A15."
- **Functions:** ***Functions*** **are built-in formulas that perform common calculations.** For instance, a function might average a range of numbers or round off a number to two decimal places.
- **Recalculation:** After the values have been entered into the worksheet, the formulas and functions can be used to calculate outcomes. However, what was revolutionary about the electronic spreadsheet was its ability to easily do recalculation. ***Recalculation*** **is the process of recomputing**

values, either as an ongoing process as data is entered or afterward, with the press of a key. With this simple feature, the hours of mind-numbing work required to manually rework paper spreadsheets have become a thing of the past.

- **What-if analysis:** The recalculation feature has opened up whole new possibilities for decision making. In particular, ***what-if analysis*** **allows the user to see how changing one or more numbers changes the outcome of the calculation.** That is, you can create a worksheet, putting in formulas and numbers, and then ask, "What would happen if we change that detail?"—and immediately see the effect on the bottom line.



Microsoft Excel worksheet templates

WORKSHEET TEMPLATES You may find that your spreadsheet software makes worksheet templates available for specific tasks. *Worksheet templates* are forms containing formats and formulas custom-designed for particular kinds of work. Examples are templates for calculating loan payments, tracking travel expenses, monitoring personal budgets, and keeping track of time worked on projects. Templates are also available for a variety of business needs—providing sales quotations, invoicing customers, creating purchase orders, and writing a business plan.

Analytical Graphics: Creating Charts

Worksheet and workbook data can be displayed in graphic form.

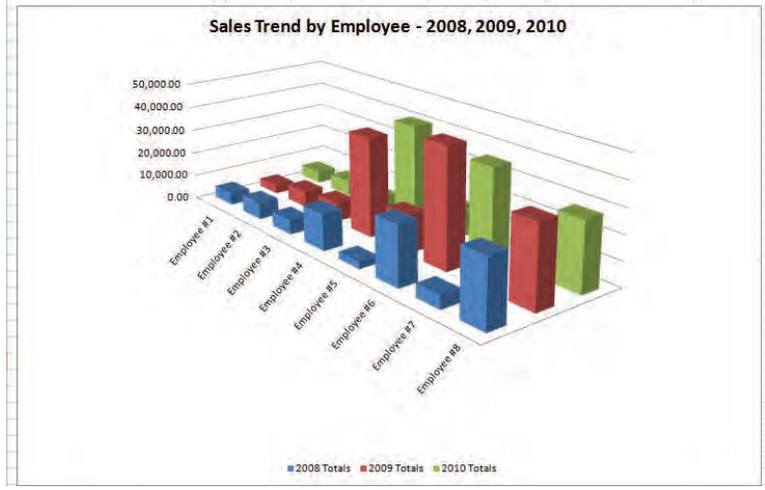
You can use spreadsheet packages to create analytical graphics, or charts. ***Analytical graphics*****, or *business graphics*, are graphical forms that make numeric data easier to analyze than it is when organized as rows and columns of numbers.** Whether viewed on a monitor or printed out, analytical graphics help make sales figures, economic trends, and the like easier to comprehend and visualize. In Excel, you enter your data to the worksheet, select the data, and use the chart-formatting tools to step through the process of choosing the chart type and various options.

Examples of analytical graphics are *column charts, bar charts, line graphs, pie charts,* and *scatter charts*. *(● See Panel 3.27.)* If you have a color printer, these charts can appear in color. In addition, they can be displayed or printed out so that they look three-dimensional.

Most spreadsheet applications are *multidimensional,* meaning that you can link one spreadsheet file to another. A three-dimensional spreadsheet model is like a stack of worksheets all connected by formulas. A change made in one worksheet automatically affects the others. Looking at data in several dimensions could include, for example, sales by region, sales by sales rep, sales by product category, sales by month, and so on. A spreadsheet program's multidimensional view might take on a 3D graphics form.

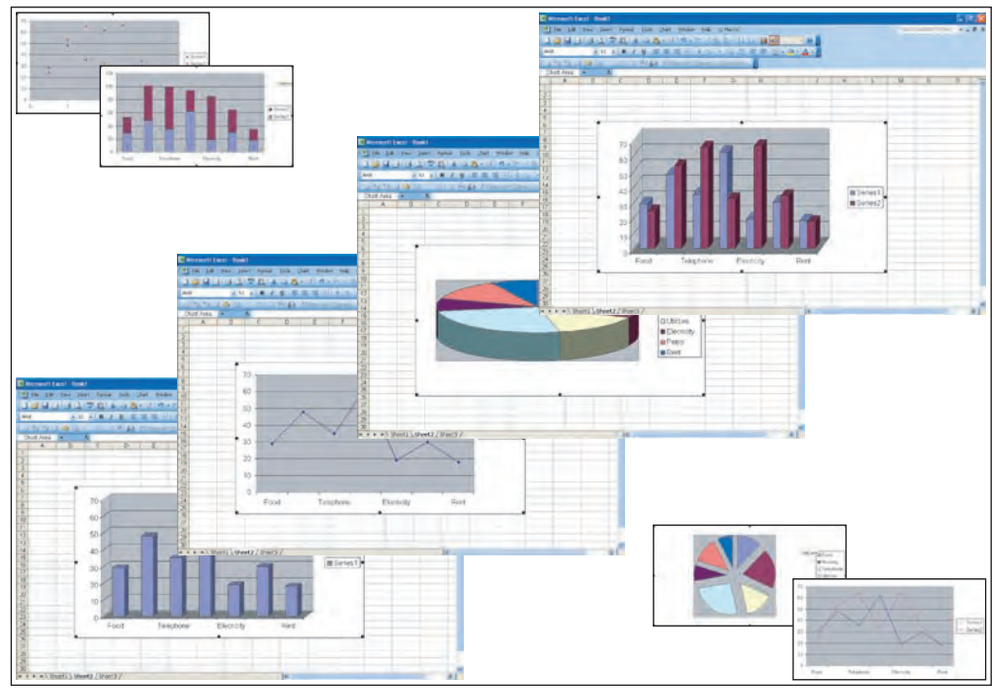
Company XYZ
Sales Trend by Employee
2008, 2009, 2010

	2008 Totals	2009 Totals	2010 Totals
Employee #1	5,000.00	3,540.00	4,970.00
Employee #2	6,880.00	6,720.00	6,315.00
Employee #3	6,000.00	7,960.00	5,412.00
Employee #4	15,000.00	40,320.00	40,650.00
Employee #5	3,000.00	15,550.00	13,260.00
Employee #6	24,070.00	48,005.00	35,348.00
Employee #7	5,675.00	3,350.00	12,145.00
Employee #8	27,000.00	32,750.00	28,030.00
	$92,625.00	$158,195.00	$146,130.00



panel 3.27

Analytical graphics
Bar charts, line graphs, and pie charts are used to display numbers in graphical form.



3.9 Database Software

A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated.

In its most general sense, a database is any electronically stored collection of data in a computer system. In its more specific sense, a ***database*** **is a collection of interrelated files in a computer system.** These computer-based files are organized according to their common elements, so that they can be

retrieved easily. Sometimes called a *database manager* or *database management system (DBMS),* ***database software*** **is a program that sets up and controls the structure of a database and access to the data.**

The Benefits of Database Software

The correct set-up and use of databases can improve the reliability of data.

When data is stored in separate files, the same data will be repeated in many files. In the old days, each college administrative office—registrar, financial aid, housing, and so on—might have a separate file on you. Thus, there was *redundancy*—your address, for example, was repeated over and over. This means that when you changed addresses, all the college's files on you had to be updated separately. Thus, database software has two advantages.

INTEGRATION With database software, the data is not in separate files. Rather, it is *integrated*. Thus, your address need only be listed once, and all the separate administrative offices will have access to the same information.

INTEGRITY For that reason, information in databases is considered to have more *integrity.* That is, the information is more likely to be accurate and up to date.

Databases are a lot more interesting than they used to be. Once they included only text. Now they can also include pictures, sound, animation, and video. It's likely, for instance, that your personnel record in a company database will include a picture of you and even a clip of your voice. If you go looking for a house to buy, you can view a real estate agent's database of video clips of homes and properties without leaving the realtor's office or your own computer.

Today the principal microcomputer database programs are Microsoft Access and FileMaker Pro. (In larger systems, Oracle, Advantage Database Server, and SQL Anywhere are major players.)

The Basics: How Databases Work

The main type of microcomputer database program is the relational database.

Let's consider some basic features of databases:

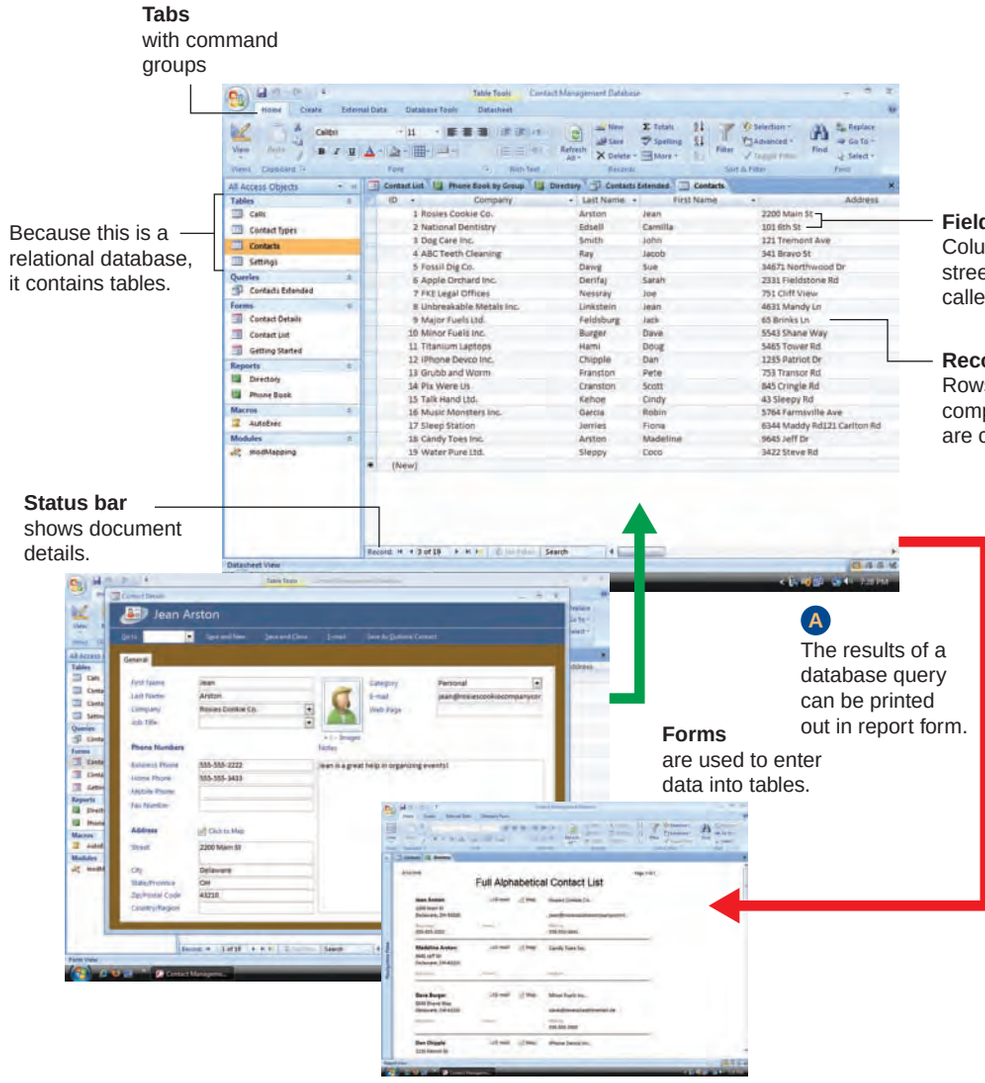
HOW A RELATIONAL DATABASE IS ORGANIZED: TABLES, RECORDS, & FIELDS The most widely used form of database, especially on PCs, is the ***relational database*****, in which data is organized into related tables.** Each table contains rows and columns; the rows are called *records,* and the columns are called *fields*. An example of a record is a person's address—name, street address, city, and so on. An example of a field is that person's last name; another field would be that person's first name; a third field would be that person's street address; and so on. *(● See Panel 3.28.)*

Just as a spreadsheet program may include a workbook with several worksheets, so a relational database program might include a database with several tables. For instance, if you're running a small company, you might have one database headed *Employees,* containing three tables—*Addresses, Payroll,* and *Benefits*. You might have another database headed *Customers,* with *Addresses, Orders,* and *Invoices* tables.

LINKING RECORDS, USING A KEY In relational databases a ***key*****—also called *key field, sort key, index,* or *keyword*—is a field used to sort data.** For example, if you sort records by age, then the age field is a key. The most frequent key field used in the United States is the Social Security number, but any unique identifier, such as employee number or student number, can be

panel 3.28

Some database functions



used. Most database management systems allow you to have more than one key so that you can sort records in different ways. One of the keys is designated the *primary key* and must hold a unique value for each record. A key field that identifies records in different tables is called a *foreign key.* A foreign key is a field in a relational table that matches the primary key of another table. Foreign keys are used to cross-reference data among relational tables.

FINDING WHAT YOU WANT: QUERYING & DISPLAYING RECORDS The beauty of database software is that you can locate records quickly. For example, several offices at your college may need access to your records but for different reasons: registrar, financial aid, student housing, and so on. Any of these offices can *query records*—locate and display records—by calling them up on a computer screen for viewing and updating. Thus, if you move, your address field will need to be corrected for all relevant offices of the college. A person making a search might make the query, *"Display the address of [your name]."* Once a record is displayed, the address field can be changed. Thereafter, any office calling up your file will see the new address.

SORTING & ANALYZING RECORDS & APPLYING FORMULAS With database software you can easily find and change the order of records in a table—in other words, they can be *sorted* in different ways—arranged alphabetically, numerically, geographically, or in some other order. For example, they can be rearranged by state, by age, or by Social Security number.

In addition, database programs contain built-in mathematical *formulas* so that you can analyze data. This feature can be used, for example, to find the grade-point averages for students in different majors or in different classes.

PUTTING SEARCH RESULTS TO USE: SAVING, FORMATTING, PRINTING, COPYING, OR TRANSMITTING Once you've queried, sorted, and analyzed the records and fields, you can simply save them to your hard disk, CD, or other secondary storage medium. You can format them in different ways, altering headings and typestyles. You can print them out on paper as reports, such as an employee list with up-to-date addresses and phone numbers. A common use is to print out the results as names and addresses on *mailing labels*—adhesive-backed stickers that can be run through your printer and then stuck on envelopes. You can use the Copy command to copy your search results and then paste them into a paper produced on your word processor. You can also cut and paste data into an email message or make the data an attachment file to an email, so that it can be transmitted to someone else.

Personal Information Managers (PIMs)

A PIM is software that serves as a planner, notebook, and address book all in one. PIMs are especially popular for PDAs

Many people find ready uses for specialized types of database software known as personal information managers. **A *personal information manager (PIM)* is software that helps you keep track of and manage information you use on a daily basis, such as addresses, telephone numbers, appointments, to-do lists, and miscellaneous notes.** Some programs feature phone dialers, outliners (for roughing out ideas in outline form), and ticklers (or reminders). With a PIM, you can key in notes in any way you like and then retrieve them later based on any of the words you typed.

Popular PIMs are Microsoft Outlook, Lotus Notes, Contactizer Pro, and Yojimbo. Microsoft Outlook, for example, has sections such as Inbox, Calendar, Contacts, Tasks (to-do list), Journal (to record interactions with people), Notes (scratchpad), and Files. *(● See Panel 3.29, next page.)*

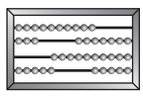
3.10 Specialty Application Software

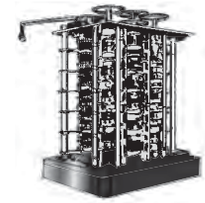
There's an app for that!

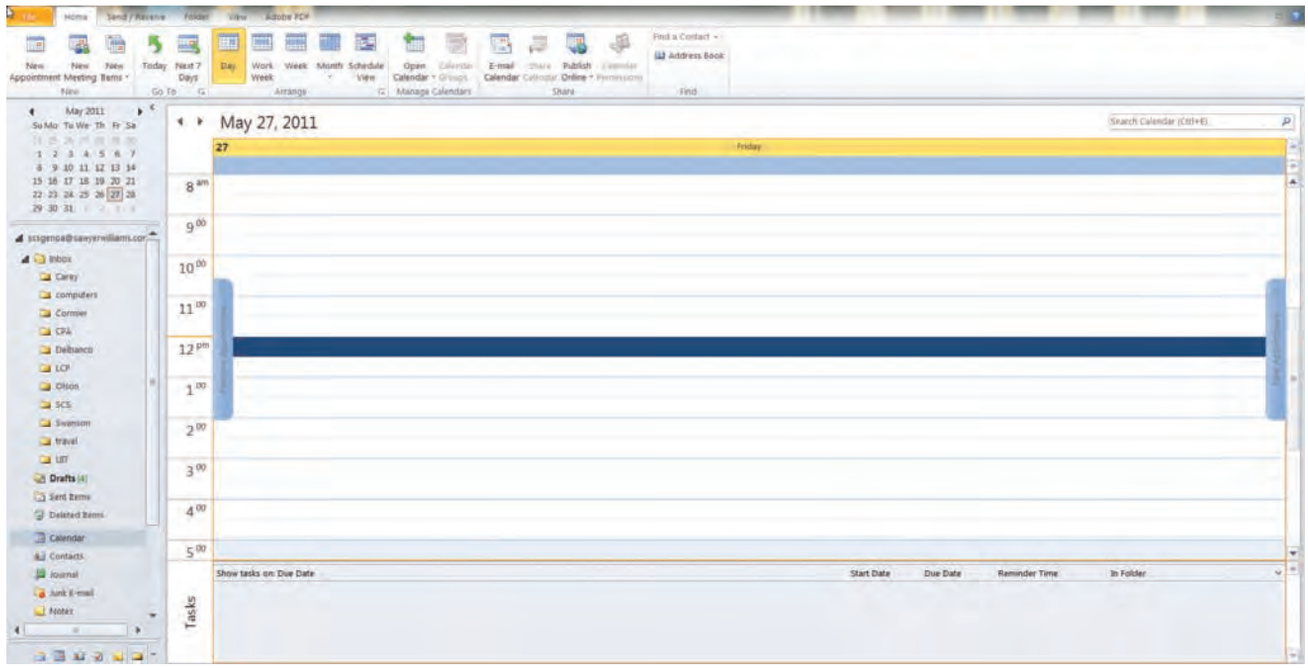
After learning some of the productivity software just described, you may wish to become familiar with more specialized programs. For example, you might first learn word processing and then move on to desktop publishing, or first learn spreadsheets and then learn personal-finance software. We consider the following kinds of software, although they are but a handful of the thousands

Timeline
Developments in software

3000 BCE	1621 CE	1642	1801	1820	1833
Abacus is invented in Babylonia	Slide rule invented (Edmund Gunther)	First mechanical adding machine (Blaise Pascal)	A linked sequence of punched cards controls the weaving patterns in Jacquard's loom	The first mass-produced calculator, the Thomas Arithnometer	Babbage's difference engine (automatic calculator)







panel 3.29
Personal information manager
Microsoft Outlook 2007

of specialized programs available: *presentation graphics, financial, desktop-publishing, drawing and painting, project management, computer-aided design, video/audio editing, animation,* and *web page design software.*

Presentation Graphics Software

Presentation graphics make information more accessible.

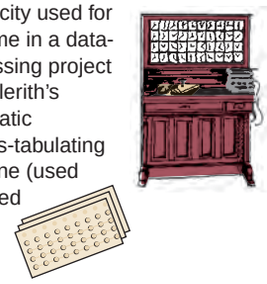
Presentation graphics software is intended primarily for creating slide-show presentations, reports, portfolios, and training materials. ***Presentation graphics software*** **uses graphics, animation, sound, and data or information to make visual presentations.** Presentation graphics are much more fancy and complicated than are analytical graphics. Pages in presentation software are often referred to as *slides,* and visual presentations are commonly called *slide shows.* They can consist, however, not only of slides but also of paper copies, video, animation, and sound. Completed presentations are frequently published in multiple formats, which may include print, the web, and electronic files.

Most often, presentation projects are used in live sessions and commonly projected onto large screens or printed as handouts to accompany the live presentation. Slides are generally intended to be followed in an ordered sequence,

1843
World's first computer programmer, Ada Lovelace, publishes her notes

1854
George Boole publishes "An Investigation on the Laws of Thought," a system for symbolic and logical reasoning that will become the basis for computer design

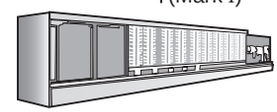
1890
Electricity used for first time in a data-processing project — Hollerith's automatic census-tabulating machine (used punched cards)

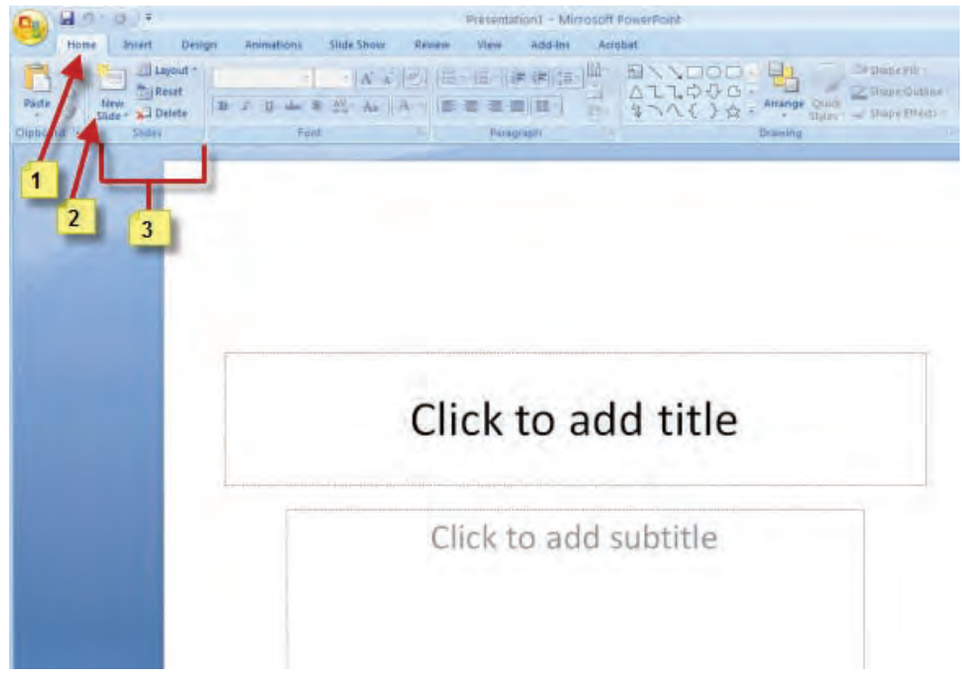


1924
T.J. Watson renames Hollerith's machine company, founded in 1896, to International Business Machines (IBM)

1930
General theory of computers (MIT)

1944
First electro-mechanical computer (Mark I)





Getting started in Microsoft Office PowerPoint 2007: 1 Tabs are designed to be task-oriented; 2 groups within each tab break a task into subtasks; 3 command buttons in each group carry out a command or display a menu of commands.

although some presentations may utilize interactive forms of navigation. This software also has the ability to export to HTML (p. 179) for posting presentations on the web.

You may already be accustomed to seeing presentation graphics, because many college instructors now use such software to accompany their lectures. Well-known presentation graphics packages include Microsoft PowerPoint, Corel Presentations, Harvard Graphics, and Presentation Graphics SDK. *(● See Panel 3.30.)* Companies such as Presentation Load (*www.presentation-load.de/powerpoint-templates/?cur=1&force_sid=jv036tse7rr9ki9abgvf436qj4*) specialize in professional templates for sophisticated business presentations.

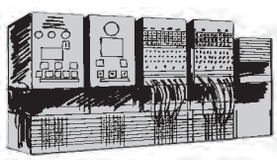
Just as word processing programs offer templates for faxes, business letters, and the like, presentation graphics programs offer templates to help you organize your presentation, whether it's for a roomful of people or over the Internet. Templates are of two types: design and content.

- **Design templates:** These offer formats, layouts, background patterns, and color schemes that can apply to general forms of content material.
- **Content templates:** These offer formats for specific subjects. For instance, PowerPoint offers templates for "Selling Your Ideas," "Facilitating a Meeting," and "Motivating a Team."

DRESSING UP YOUR PRESENTATION Presentation software makes it easy to dress up each visual page ("slide") with artwork by pulling in ("dragging and dropping") clip art from other sources. Although presentations may make use of some

1946

First programmable electronic computer in United States (ENIAC)



1967

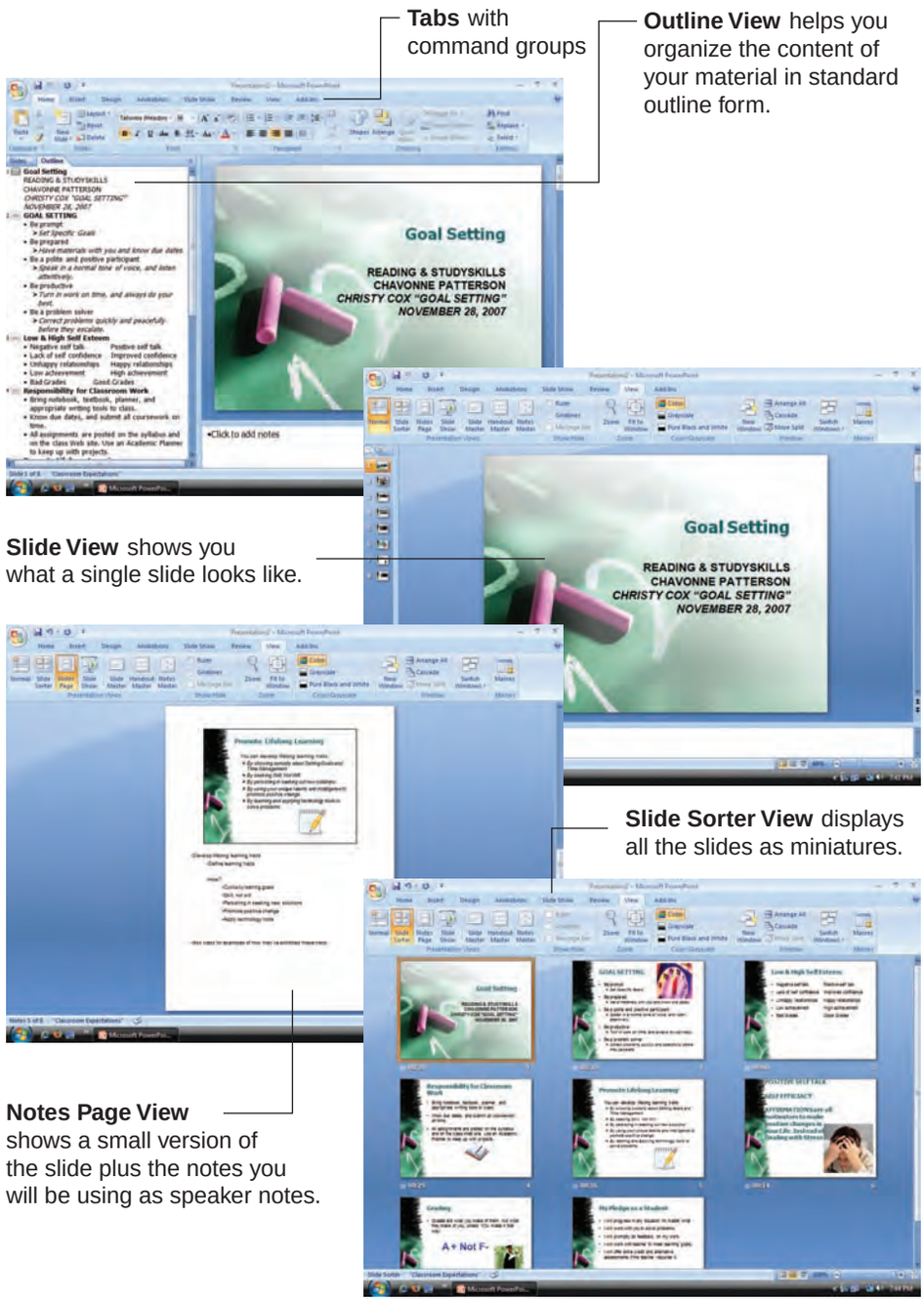
A graphical user interface (GUI) is a main theme of Jeff Raskin, who later became an Apple Macintosh team leader; handheld calculator

1969–1971

Unix is developed and released by Bell Laboratories

1970

Microprocessor chips come into use; floppy disk introduced for storing data

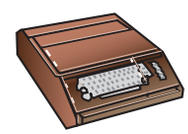

Tabs with command groups
Outline View helps you organize the content of your material in standard outline form.
Goal Setting
READING & STUDYSKILLS
CHAVONNE PATTERSON
CHRISTY COX "GOAL SETTING"
NOVEMBER 28, 2007
Slide View shows you what a single slide looks like.
Slide Sorter View displays all the slides as miniatures.
Notes Page View shows a small version of the slide plus the notes you will be using as speaker notes.

panel 3.30

Presentation graphics
Microsoft PowerPoint 2007

basic analytical graphics—bar, line, and pie charts—they generally use much more sophisticated elements. For instance, they may display different textures (speckled, solid, cross-hatched), color, and three-dimensionality. In addition, you can add sound clips, special visual effects (such as blinking text), animation, and

1973	1975	1976	1977
Xerox PARC develops an experimental PC that uses a mouse and a GUI	Bill Gates and Paul Allen start Microsoft in Albuquerque, N.M. (move to Seattle in 1979); first microcomputer (MITS Altair 8800)	Apple I computer (first personal computer sold in assembled form)	Apple II's floppy disk drive leads to writing of many software programs



video clips. (You can, in fact, drag and drop art and other enhancements into desktop-publishing, word processing, or other standard PC applications.)

Financial Software

Financial software can help you with regular budgets and bill paying, as well as taxes and financial planning.

Financial software **is a growing category that ranges from personal-finance managers to entry-level accounting programs to business financial-management packages.**

Consider the first of these, which you may find particularly useful. ***Personal-finance managers*** **let you keep track of income and expenses, write checks, do online banking, and plan financial goals.** *(● See Panel 3.31.)* Such programs don't promise to make you rich, but they can help you manage your money. They may even get you out of trouble. Popular microcomputer personal finance programs include Quicken, Ace Money, Moneydance, and YNAB (You Need A Budget).

FEATURES OF FINANCIAL SOFTWARE The principal features are these:

1. TRACKING OF INCOME & EXPENSES: The programs allow you to set up various account categories for recording income and expenses, including credit card expenses.

2. CHECKBOOK MANAGEMENT: All programs feature checkbook management, with an on-screen check-writing form and check register that look like the ones in your checkbook. Checks can be purchased to use with your computer printer.

more info!

Adding Clip Art

For information on adding clip art to presentation slides, check out:

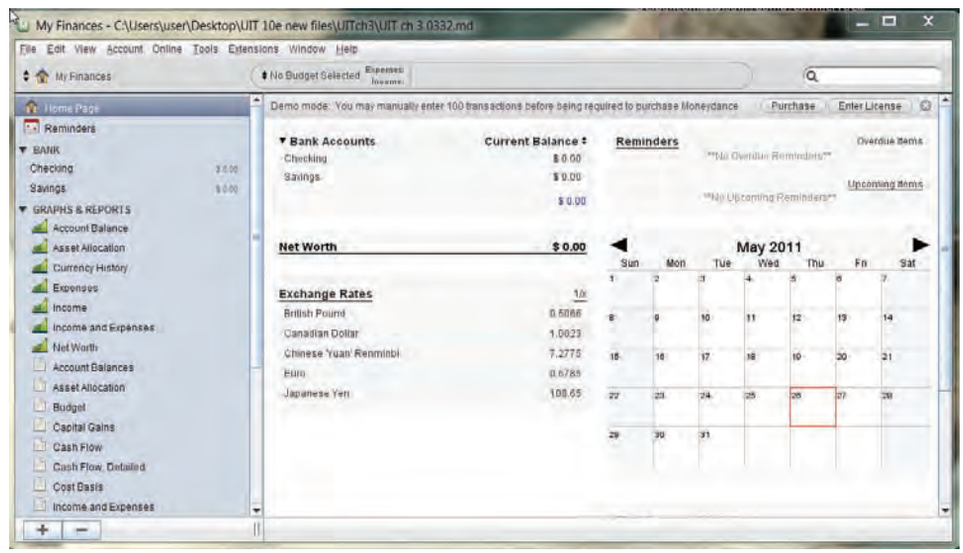
www.thinkoutsidetheslide.com/articles/using_clip_art_photo.htm
www.clipartpress.com/43 http://presentationsoft.about.com/od/nextstepsinpowerpoint/ss/add_pics.htm
http://webclipart.about.com/library/weekly/bluse.htm
www.ideabook.com/tutorials/illustrations/how_to_choose_and_use_clip_art.html

For information on obtaining clip art, go to:

www.clipartinc.com
http://dir.yahoo.com/Computers_and_Internet/Graphics/Clip_art/
http://office.microsoft.com/en-us/images

panel 3.31

Financial software
Moneydance can be used for all sorts of money-related management. It includes guidance tips for setting up your accounts.



1978	1980	1981	1982	1983	1984
The first electronic spreadsheet, VisiCalc, is introduced; WordStar, the first commercial word processor for consumers, is introduced	Microsoft obtains DOS version that becomes PC-DOS for IBM PC.	Xerox introduces mouse-operated icons, buttons, and menus on the Star computer; IBM introduces personal computer (IBM PC)	Portable computers	Bill Gates announces the first version of the Windows operating system (and releases it two years later)	Apple Macintosh; first personal laser printer; the Apple Macintosh introduces the first widely used GUI; Mac System 1.0 is introduced

3. REPORTING: All programs compare your actual expenses with your budgeted expenses. Some will compare this year's expenses to last year's.

4. INCOME TAX: All programs offer tax categories, for indicating types of income and expenses that are important when you're filing your tax return.

5. OTHER: Some of the more versatile personal-finance programs also offer financial-planning and portfolio-management features.

GOING BEYOND PERSONAL FINANCE Besides personal-finance managers, financial software includes small business accounting and tax software programs, which provide virtually all the forms you need for filing income taxes. Tax programs such as TaxCut and TurboTax make complex calculations, check for mistakes, and even unearth deductions you didn't know existed. Tax programs can be linked to personal-finance software to form an integrated tool.

Many financial software programs may be used in all kinds of enterprises. For instance, accounting software such as Intuit Quickbooks and Sage Software's Peachtree automates bookkeeping tasks, while payroll software keeps records of employee hours and produces reports for tax purposes.

Some programs go beyond financial management and tax and accounting management. For example, Business Plan Pro and Small Business Management Pro can help you set up your own business from scratch.

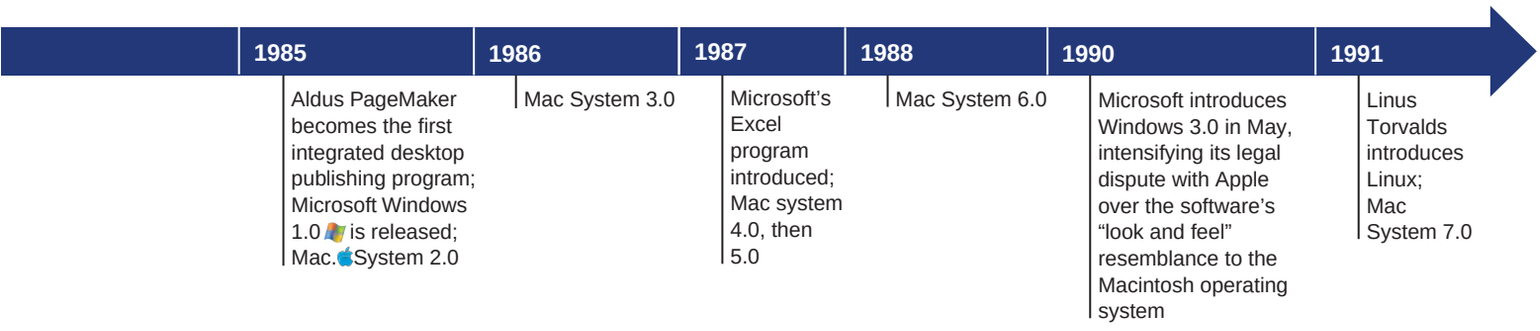
Finally, there are investment software packages, such as StreetSmart Pro from Charles Schwab, as well as various retirement-planning programs.

Desktop Publishing

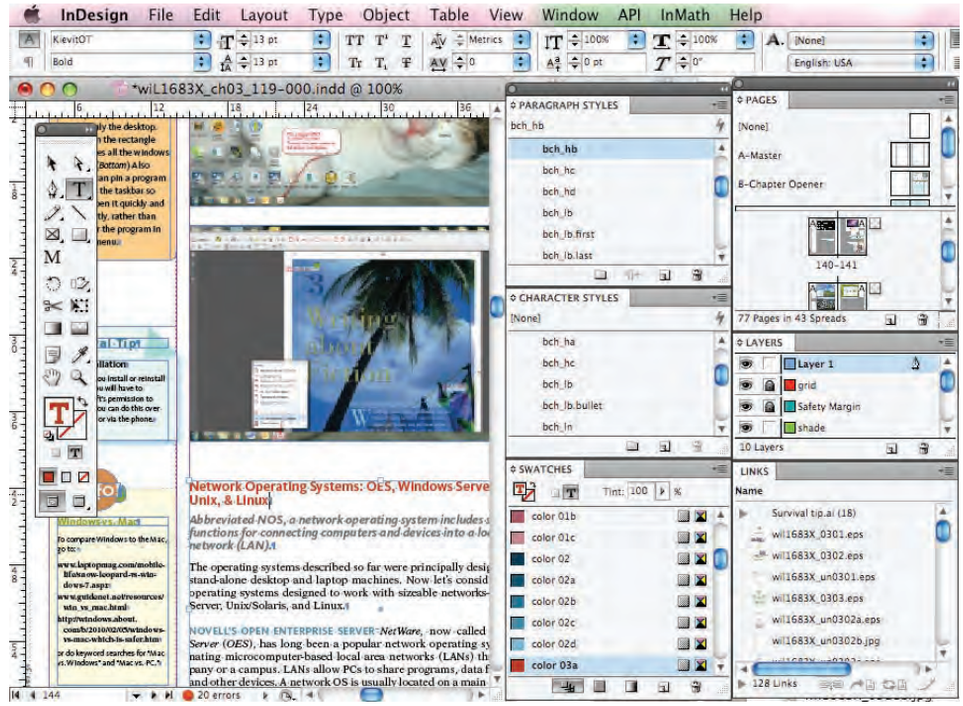
Desktop publishing software can make all types of documents look professional.

Adobe Systems was founded in 1982, when John Warnock and Charles Geschke began to work on solving some of the long-standing problems that plagued the relationship between microcomputers and printers. Collaboration with Apple Computers produced the first desktop-publishing package, using Adobe PostScript, a printer language that can handle many fonts and graphics, in 1984. By 1987 Adobe had agreements with IBM, Digital, AST Research, Hewlett-Packard, and Texas Instruments for them to use PostScript in their printers.

Desktop publishing (DTP) **involves mixing text and graphics to produce high-quality output for commercial printing, using a microcomputer and mouse, scanner, digital cameras, laser or ink-jet printer, and DTP software.** Often the printer is used primarily to get an advance look before the completed job is sent to a typesetter service bureau or a professional printer for even higher-quality output. Service bureaus and printers have special machines that convert the DTP files to film, which can then be used to make plates for offset printing or be used to go straight to digital printing. Offset printing produces higher-quality documents, especially if color is used, but is generally more expensive than digital printing.


1985
Aldus PageMaker becomes the first integrated desktop publishing program; Microsoft Windows 1.0 is released; Mac System 2.0
1986
Mac System 3.0
1987
Microsoft's Excel program introduced; Mac system 4.0, then 5.0
1988
Mac System 6.0
1990
Microsoft introduces Windows 3.0 in May, intensifying its legal dispute with Apple over the software's "look and feel" resemblance to the Macintosh operating system
1991
Linus Torvalds introduces Linux; Mac System 7.0

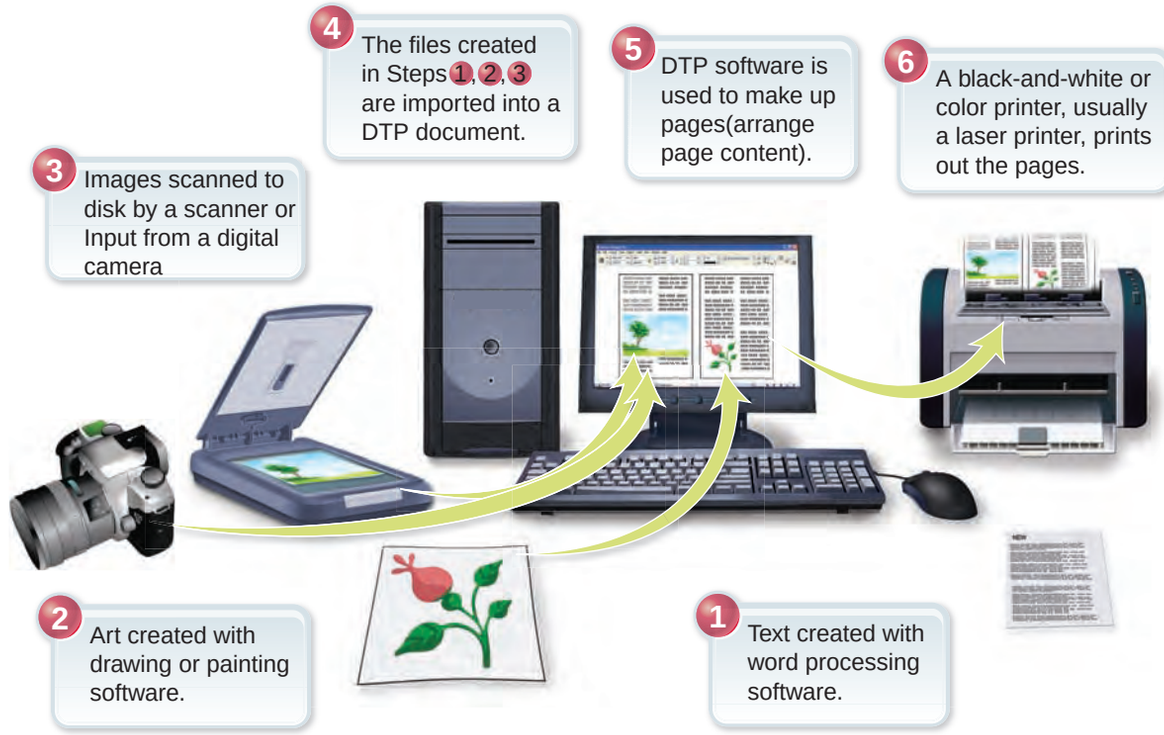
Desktop-publishing software. Adobe InDesign CS5 allows users to create interactive documents with sound, video, graphics, colors, text, and photos, all ready to go to a professional printer. (For an InDesign CS5 video overview, go to *http://tv.adobe.com/watch/cs5-design-premium-feature-tour/indesign-cs5-overview.*)



FEATURES OF DESKTOP PUBLISHING Desktop publishing has these characteristics:

- **Mix of text with graphics:** Desktop-publishing software allows you to precisely manage and merge text with graphics. As you lay out a page on-screen, you can make the text "flow," liquidlike, around graphics such as photographs. You can resize art, silhouette it, change the colors, change the texture, flip it upside down, and make it look like a photo negative.
- **Varied type & layout styles:** As do word processing programs, DTP programs support a variety of fonts, or typestyles, from readable Times Roman to staid Tribune to wild Jester and Scribble. Additional fonts can be purchased on disk or downloaded online. You can also create all kinds of rules, borders, columns, and page-numbering styles.
- **Use of files from other programs:** It's usually not efficient to do word processing, drawing, and painting with the DTP software. As a rule, text is composed on a word processor, artwork is created with drawing and painting software, and photographs are input using a scanner and then modified and stored using image-editing software. Prefabricated art to illustrate DTP documents may be obtained from clip-art sources. The DTP program is used to integrate all these files. You can look at your work on the display screen as one page, as two facing pages (in reduced size), or as "thumbnails." Then you can see it again after it has been printed out. *(● See Panel 3.32.)*

1992	1993	1994	1995	1997	1998	1999	2000
Microsoft's Access database program released	Multimedia desktop computers PDF software	Apple and IBM introduce PCs with full-motion video built in; wireless data transmission for small portable computers; Netscape's first web browser is introduced (based on Mosaic, introduced in 1993)	Windows 95 is released	Mac OS 8 sells 1.25 million copies in its first two weeks	Windows 98 is released	Adobe InDesign	Windows 2000 (ME) is released; Mac System 9.0


4
The files created in Steps 1, 2, 3 are imported into a DTP document.
5
DTP software is used to make up pages(arrange page content).
6
A black-and-white or color printer, usually a laser printer, prints out the pages.
3
Images scanned to disk by a scanner or Input from a digital camera
2
Art created with drawing or painting software.
1
Text created with word processing software.

panel 3.32
How desktop publishing uses other files

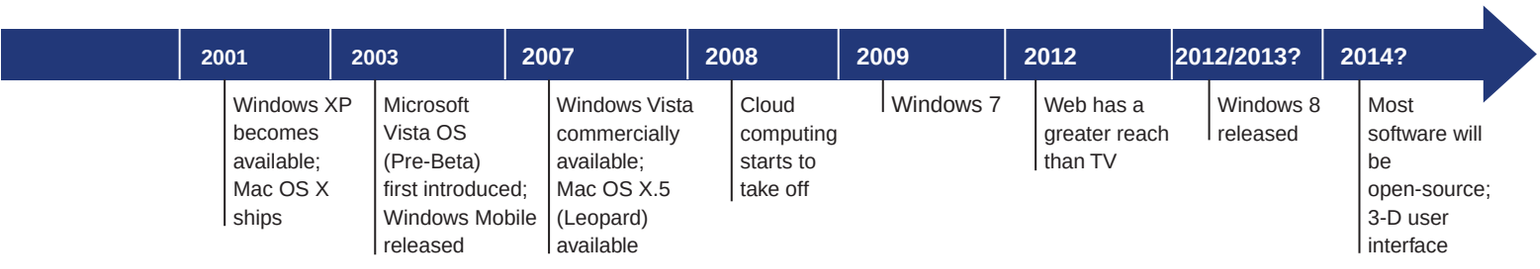
BECOMING A DTP PROFESSIONAL Not everyone can be successful at desktop publishing, because many complex layouts require experience, skill, and knowledge of graphic design. Indeed, use of these programs by nonprofessional users can lead to rather unprofessional-looking results. Nevertheless, the availability of microcomputers and reasonably inexpensive software has opened up a career area formerly reserved for professional typographers and printers.

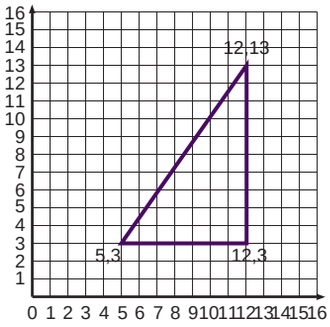
QuarkXPress and Adobe InDesign are "high-end" professional DTP programs. Microsoft Publisher 2010 is a "low-end," consumer-oriented DTP package. Some word processing programs, such as Word and WordPerfect, also have many DTP features, although still not at the sophisticated level of the specialized DTP software. DTP packages, for example, give you more control over typographical characteristics and provide more support for full-color output.

Drawing & Painting Programs

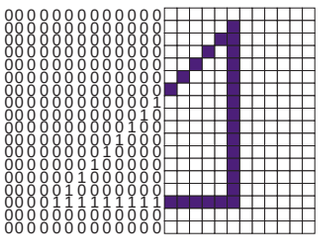
There are several types of software for illustrators.

Commercial artists and fine artists have largely abandoned the paintbox and pen-and-ink for software versions of palettes, brushes, and pens. However, even nonartists can produce good-looking work with these programs.





Vector image



Bit-mapped image

There are two types of computer art programs, also called *illustration software*—drawing and painting.

DRAWING PROGRAMS A *drawing program* is graphics software that allows users to design and illustrate objects and products. Some drawing programs are CorelDRAW, Adobe Illustrator, and SmartDraw.

Drawing programs create *vector images*—images created from geometrical formulas. Almost all sophisticated graphics programs use vector graphics.

PAINTING PROGRAMS *Painting programs* are graphics programs that allow users to simulate painting on-screen. A mouse or a tablet stylus is used to simulate a paintbrush. The program allows you to select "brush" sizes, as well as colors from a color palette. Examples of painting programs are Adobe PhotoShop, Microsoft Digital Image Pro, Corel Photopaint, and JASC's PaintShop Pro.

Painting programs produce *bit-mapped images,* or *raster images,* made up of little dots.

Painting software is also called *image-editing software* because it allows you to retouch photographs, adjust the contrast and the colors, and add special effects, such as shadows.

SOME GRAPHICS FILE FORMATS When you create an image, it's important to choose the most appropriate graphics file format, which specifies the method of organizing information in a file. Among the most important graphics formats you are apt to encounter are these (more formats are covered in Chapter 8):

- **.bmp (BitMaP):** This bitmap graphic file format is native to Microsoft Windows and is used on PCs. Microsoft Paint creates .bmp file formats.
- **.gif (Graphic Interchange Format):** This format is used in web pages and for downloadable online images.
- **.jpeg (Joint Photographic Experts Group):** Pronounced *"jay-peg,"* this bitmapped format is used for websites and for photos and other high-resolution images.
- **.tiff (Tagged Image File Format):** This bitmapped format is used on both PCs and Macs for high-resolution files that will be printed.
- **.png (Portable network Graphics):** This file format was specifically created for web page images and can be used as a public domain alternative to .gif for compression.

more info!

File Formats

For a complete list of file formats, go to:

http://en.wikipedia.org/wiki/List_of_file_formats

Video/Audio Editing Software

Video and audio editing has become easier to do on microcomputer systems.

The popularity of digital camcorders ("camera recorders") has caused an increase in sales of video-editing software. This software allows you to import video footage to your PC and edit it, for example, deleting parts you don't want, reordering sequences, and adding special effects. Popular video-editing software packages include Adobe Premiere Elements, Corel Video Studio, Sony Pictures Digital Vegas, Magix Movie Edit Pro, Roxio Creator, Apple Final Cut Express, Pinnacle Studio DV, CyberLink Power Director, and Ulead VideoStudio.

Audio-editing software provides similar capabilities for working with sound tracks, and you can also clean up background noise (called *artifacts*) and emphasize certain sound qualities. Sound-editing software includes Windows Sound Recorder, Sony Pictures Sound Forge, Audacity (freeware), Felt Tip Software's Sound Studio (shareware), GoldWave, and WavePad.

Video and audio are covered in more detail in Chapter 5.

Survival Tip

Compressing Web & Audio Files

Video and audio files tend to be very large, so they need to be edited down and compressed to be as short as possible, especially if they are to be used on web pages. Your software documentation will explain how to do this.

Sophisticated application software. Animation artist at work at the Studio Ghibli, Mitaka, Japan.

more info!

About Animation

For sources about animation, go to:

http://animation.about.com/od/referencematerials/a/freesoftware.htm

www.sciencedaily.com/articles/c/computer_animation.htm

http://entertainment.howstuffworks.com/computer-animation.htm

www.edb.utexas.edu/minliu/multimedia/Computer%20Animation.pdf

For schools offering training in computer-based graphics, including animation, check out:

www.computertrainingschool.com/?googleanimation=y&got=3d_animation_training&t=30

Animation Software

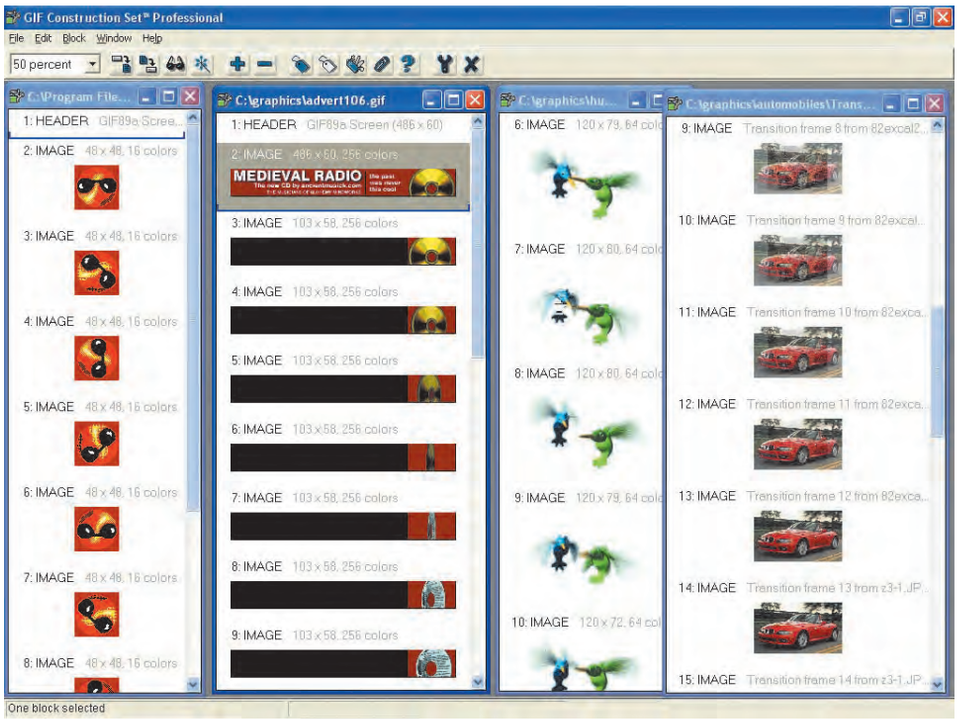
Animation is usually a part of multimedia presentations.

Animation **is the simulation (illusion) of movement created by displaying a series of still pictures, or frames, very quickly in sequence.** *Computer animation* refers to the creation of moving images by means of a computer. Whereas video devices record continuous motion and break it up into discrete frames, animation starts with independent pictures and puts them together to

MICROSOFT GIF ANIMATOR

Microsoft Gif Animator was released by Microsoft long back but still it is popular as it works on all the popular versions of Windows, and **no installation** is required, simply select the picture and that's it.

Microsoft Gif Animator provides a very easy to use freeware. To create GIF animation you need to select all the images that you want in your animation and arrange them in the required order simple Microsoft Gif Animator will create GIF animation for you.


GIF Construction Set® Professional
File Edit Block Window Help
50 percent
C:\graphics\advert106.gif
1: HEADER GIF89a Screen (486 x 60)
2: IMAGE 486 x 60, 256 colors
MEDIEVAL RADIO
3: IMAGE 103 x 58, 256 colors
4: IMAGE 103 x 58, 256 colors
5: IMAGE 103 x 58, 256 colors
6: IMAGE 103 x 58, 256 colors
7: IMAGE 103 x 58, 256 colors
8: IMAGE 103 x 58, 256 colors
9: IMAGE 103 x 58, 256 colors
One block selected

Screen from a GIF animation program

form the illusion of continuous motion. Animation is one of the chief ingredients of multimedia presentations and is commonly used on web pages. There are many software applications that enable you to create animations that you can display on a computer monitor.

The first type of animation to catch on for web use was called *GIF* (for Graphics Interchange Format) animation, and it is still very popular today. GIF files contain a group of images that display very quickly to simulate movement when a web page viewer clicks on the file icon. Animated GIF Construction Professional enables users to easily create animation via the use of a wizard. It allows the creation of many special effects and supports compression, as well as offering tutorials. Among the many other GIF animation software packages are Ulead Gif Animator and Easy Gif Animator.

Multimedia authoring software

Adobe Director 11.5
Introducing Director 11.5
All-new audio engine plus enhanced video and 3D support
See top features ›
NEXT STEPS
Buy online
Sales 800-585-0774
Download free trial
Get support
DIRECTOR 11.5 HOME
PRODUCT INFO
Features
Upgrade details
Director Showcase
Reviews and awards
FAQ
System requirements
Shockwave Player
Shockwave Player statistics
Compare to Flash
DIRECTOR FOR
Multimedia authors
Game developers
eLearning authors
SEE ALSO
Support
Developer Center
User forums
Events and seminars
RELATED PRODUCTS
Adobe Creative Suite 4
Adobe Photoshop CS4
Adobe Flash CS4 Professional
Adobe Illustrator CS4
Adobe After Effects CS4
Explore new dimensions in rich multimedia authoring
Adobe® Director® 11.5 and Adobe Shockwave® Player software help you create and publish compelling interactive games, demos, prototypes, simulations, and eLearning courses for the web, Mac and Windows® desktops, DVDs, and CDs. Integrate virtually any major file format, including FLV and native 3D content, for the greatest return on your creativity.
See upgrade details
Allen Partridge, Adobe Director evangelist, discusses the exciting new features in the latest release
Read more
Adobe Director 11.5
Buy US$999
Upgrade from US$299
Download free trial
WHAT'S NEW
Play game: Cybershock - Panic Station
Experience the new demo game developed using Director 11.5
Play the game
Play game: GoKartGo!Turbo!
Experience the new demo game developed using Director 11.5
TOP FEATURES IN DIRECTOR 11.5
Support for more than 40 video, audio, and image file formats
Rich audio capabilities with 5.1 channel surround sound, real-time mixing, and DSP filters
Support for MP4, H.264, FLV, and F4V video formats and video streaming
Powerful 3D support including Google SketchUp importer
Advanced physics with NVIDIA® PhysX™ support

Multimedia Authoring Software

Multimedia software brings together many components.

Multimedia authoring software **combines text, graphics, video, animation, and sound in an integrated way to create stand-alone multimedia applications.** Content can be burned to CDs/DVDs or delivered via the web. Until the mid-1990s, multimedia applications were relatively uncommon, owing to the expensive hardware required. With increases in performance and decreases in price, however, multimedia is now commonplace. Nearly all microcomputers are capable of displaying video, though the resolution

available depends on the power of the computer's video adapter and CPU. Macromedia Director and Macromedia Authorware are two popular multimedia authoring packages.

Many websites, as well as business training centers and educational institutions, use multimedia to develop interactive applications.

Web Page Design/Authoring Software

Software that allows you to create your own websites.

Web page design/authoring software **is used to create web pages with sophisticated multimedia features.** A few of these packages are easy enough for beginners to use. Some of the best-known are Adobe Dreamweaver, Seamonkey, Adobe Flash, Coffee Cup Visual Site Designer, RealMac Rapid Weaver, Microsoft Expression Web 4, and Dynamic HTML Editor. These tools generate the necessary HTML coding (p. 69) (and other, newer language coding) based on the user's design and content and present everything to the design in a WYSIWYG ("what you see is what you get") form. *(● See Panel 3.33.)*

more info!

Web Authoring

This site offers a lot of information on web authoring tools:

http://webdesign.about.com/od/htmleditors/HTML_Editors_Web_Page_Authoring_Tools.htm

more info!

For some basic steps of web design, go to:

www.grantasticdesigns.com/5rules.html

www.chromaticsites.com/blog/12-steps-to-creating-a-professional-web-design/

www.rcaguilar.com/html-design.htm

http://ezinearticles.com/?Basic-Steps-For-Website-Design&id=5462320

For information on becoming a professional website designer, try:

www.wikihow.com/Become-a-Professional-Web-Designer-and-Programmer

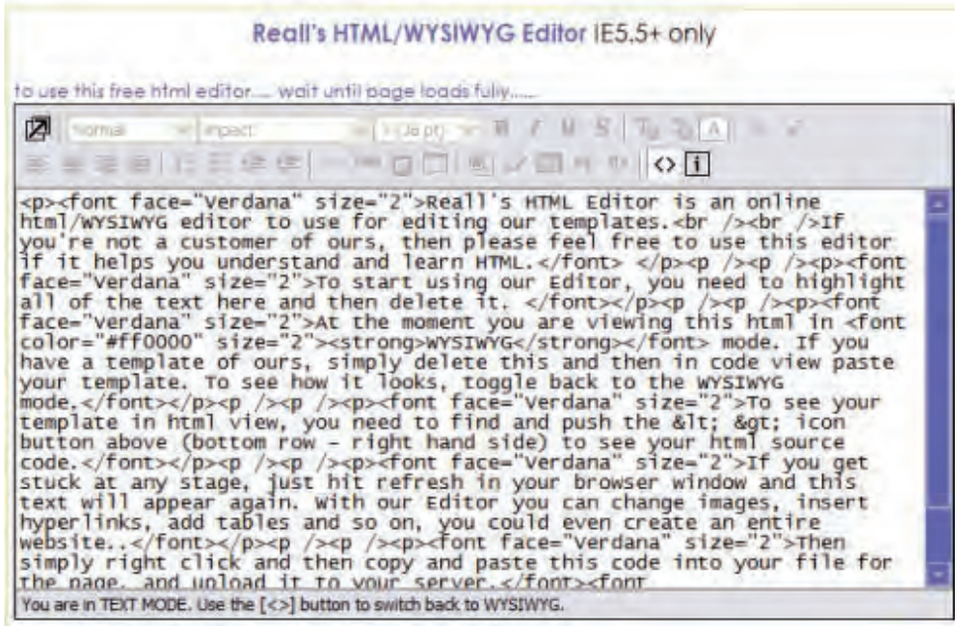
http://designeducation.allgraphicdesign.com/

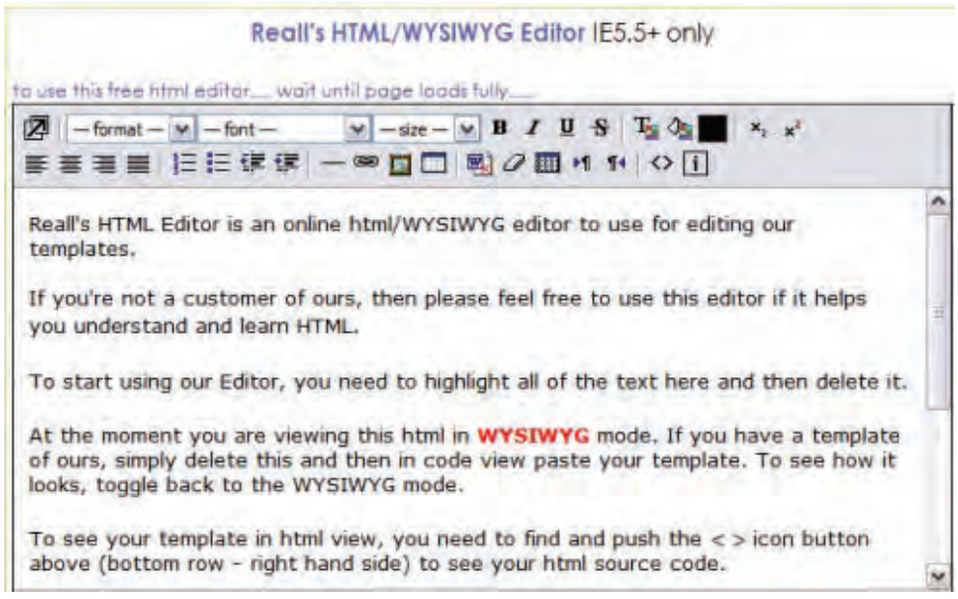
http://websitetips.com/business/education/

www.tuj.ac.jp/newsite/main/cont-ed/certificate/graphic_design.html

http://webdesign.about.com/od/jobs/p/aa031703a.htm

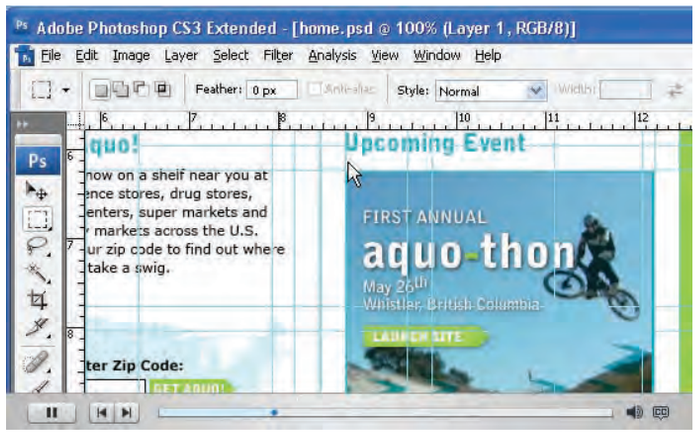
http://jobsearchtech.about.com/od/careerplanning/l/aa070201.htm





panel 3.33

(*Top*) HTML coded text; (*bottom*) the same text translated into WYSIWYG form by Reall's HTMLWYSIWYG Editor



Inserting an Adobe Photoshop photo file into a Dreamweaver web page that is being designed

Internet access providers also offer some free, easy-to-use web-authoring tools for building simple websites. They help you create web pages, using icons and menus to automate the process; you don't need to know hypertext markup language to get the job done. These automated tools let you select a prepared, template web page design, type a few words, add a picture or two—and you're done. To save the pages and make them accessible on the Internet, the provider grants you a certain amount of space on its web servers.

Website design can include much more than text: for example, animation, video, sound, interactivity, search-engine functions. But before creating a website, the designer must first plan exactly what is needed in the website—define the audience, as well as the purpose and the content. Once a website is completed, it must be uploaded (published) in order to be available to Internet users via a browser. Some people with powerful personal computers and an always-on Internet connection, such as cable, leave their websites on their own computers; the website is accessed by users typing in the site's URL (web address; Chapter 2, p. 66) in their browsers. Most people, however, use ftp software (covered shortly) to upload their website files to a server host, where, for a fee, the website is stored for access.

Complicated business websites are created and maintained by professional website developers.

more info!

Social Media Management Software

There is also software for managing your social networking and media activities:

http://workawesome.com/software/social-media-management/

www.vivalogo.com/vl-resources/open-source-social-networking-software.htm

www.web-strategist.com/blog/2010/03/19/list-of-social-media-management-systems-smms/

www.crowdcontrolhq.com/social-media-management-software/

Project Management Software

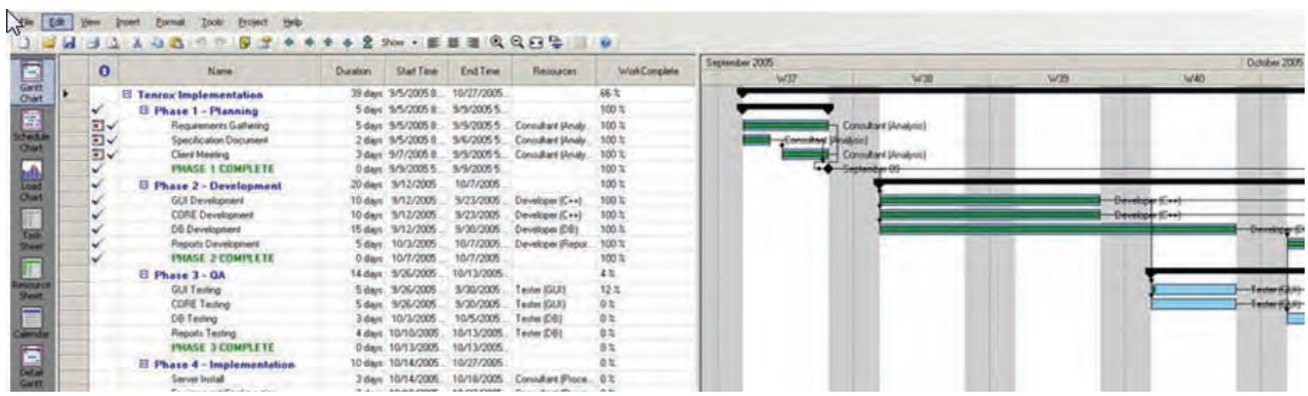
Software can be very helpful in managing large projects.

As we have seen, a personal information manager (PIM) can help you schedule your appointments and do some planning. That is, it can help you manage your own life. But what if you need to manage the lives of others in order to accomplish a full-blown project, such as steering a political campaign or handling a nationwide road tour for a band? Strictly defined, a *project* is a one-time operation involving several tasks and multiple resources that must be organized toward completing a specific goal within a given period of time. The project can be small, such as an advertising campaign for an in-house advertising department, or large, such as construction of an office tower or a jetliner.

Project management software **is a program used to plan and schedule the people, costs, and resources required to complete a project on time.** *(● See Panel 3.34.)* For instance, the associate producer on a feature

panel 3.34

Project management software: Tenrox



PRACTICAL ACTION

Help in Building Your Web Page

Local and national Internet access providers often offer web-page-building tools, as well as space on their servers for storing your web page. Other sources of information for designing and building web pages are these:

For Novices

- ***Yahoo!:*** Yahoo! offers web-page-building tools and templates under the name SiteBuilder (*http://webhosting.yahoo.com/ps/sb/index.php*), which enables you to add music and other special effects to your web pages and have components that track how many people visit your site. For a fee, Yahoo! offers unlimited storage for your website and will help you determine your URL (website address).
- ***Lycos:*** Lycos offers templates and tools, and it also offers tutorials to help you get started if you want to build your own pages from scratch. Lycos also offers free space in its Tripod area (*www.tripod.lycos.com*). As with Yahoo!, you will have advertisements on your pages unless you pay a small fee to get rid of them.
- ***Google Sites:*** Google offers this free online tool that makes it easy for anyone to create and publish web pages in just minutes. You can see what your pages will look like, and you can edit your pages right in your browser. Google will host your web pages on your own site at *www.google.com/accounts/ServiceLogin?continue=http%3A%2F%2Fsites.google.com%2F&followup=http%3A%2F%2Fsites.google.com%2F&service=jotspot&passive=true&ul=.1*

Once you've created your website, you'll need to "publish" it—upload it to a web server for viewing on the Internet. You can get upload instructions from your online service or Internet access provider, which may also provide space (for free or for a fee) on its servers. (Or, as we mentioned earlier, if you have a powerful, large-storage-capacity microcomputer that has an always-on Internet connection, you can use it to host your own website.)

For much more information about building and storing your own web pages, just do a keyword search using "build web page" or "website design" in any good search engine.

film might use such software to keep track of the locations, cast and crew, materials, dollars, and schedules needed to complete the picture on time and within budget. The software would show the scheduled beginning and ending dates for a particular task—such as shooting all scenes on a certain set—and then the date that task was actually completed. Examples of project management software are Mindjet MindManager Pro 9, MindView, Intuit Eclipse, Microsoft Project, FastTrackSchedule, and Project KickStart.

Integrated Software & Software Suites

Some programs combine several applications in one package.

Integrated software, for personal computers, combines several applications in one program, typically providing at least word processing, spreadsheet, and database management. Presentation graphics, page layout, paint, calendar, address book, email, and other applications may also be included. Microsoft Works and AppleWorks are two primary examples of integrated software packages. One of the benefits of integrated software is that it eliminates the need to open a separate software application for reference purposes or to perform a few quick tasks. However, integrated software programs have been scaled back from their full-fledged versions and do not offer all the features and functions of each program.

Software suites are not the same as integrated software packages; they are bundled software—several programs available together in a single package. Although there are suites for graphics, mathematics, and other applications, the most popular are "office suites." Also known as "productivity suites," they are a set of basic programs that use a single user interface. The primary programs

more info!

Top-Selling Software 2009–2010

1. Microsoft Office 2007 Home & Student (Windows)
2. Turbo Tax 2009 Deluxe (Windows/Mac)
3. Microsoft Office 2008 Home & Student (Mac)
4. Microsoft Windows 7 Home Premium Upgrade
5. Norton 360 3.0 (Windows)
6. iWork 2009 (Mac)
7. Microsoft Office 2007 (Windows)
8. QuickBooks 2010 Pro (Windows)
9. Turbo Tax 2009 Home & Business Federal + State (Windows/Mac)
10. MobileMe (Windows/Mac)

(The NPD Group/Retail Tracking Service, *The World Almanac and Book of Facts, 2011*)

Survival Tip

Try before You Buy

Free trial versions of software are often offered as downloads from company sites.

are word processing, spreadsheet, presentation graphics, database, and email, although other programs and utilities may also be included; examples of software suites are Microsoft Office, WordPerfect Office, Lotus SmartSuite, StarOffice, OpenOffice.org, Google Apps, and Zoho.

Portable Document Format (PDF)

PDF is a multiplatform file format that allows documents to be used with any operating system.

Short for ***Portable Document Format*, PDF is a file format developed by Adobe Systems that preserves most attributes (including text, color, formatting, graphics, layout, and more) of a source document no matter which application, platform, and hardware type was originally used to create it.** PDF captures information from a variety of applications on different platforms making it possible to send documents and have them appear on the recipient's monitor (or printer) as they were intended to be viewed. *(● See Panel 3.35.)*

Originally PDF was mostly used by graphic artists, designers, and publishers for producing color page proofs. Today, however, PDF is used for virtually any data that needs to be exchanged among applications and users. Individuals, businesses, and government agencies around the world trust and rely on PDF to communicate. PDF files are widely used on websites and are also used to distribute electronic documents over networks and via email.

A PDF file can be shared, viewed, and printed by anyone using the free downloadable Adobe Reader software regardless of the operating system and original application used. PDF can also be used on mobile devices. In addition, many applications, such as Microsoft Word, enable users to save their files in a PDF version. To be able to create and work with all of Adobe's PDF features, you need to purchase the complete Adobe Acrobat Suite.

Computer-Aided Design (CAD)

CAD uses computer programs to design two- and three-dimensional models.

more info!

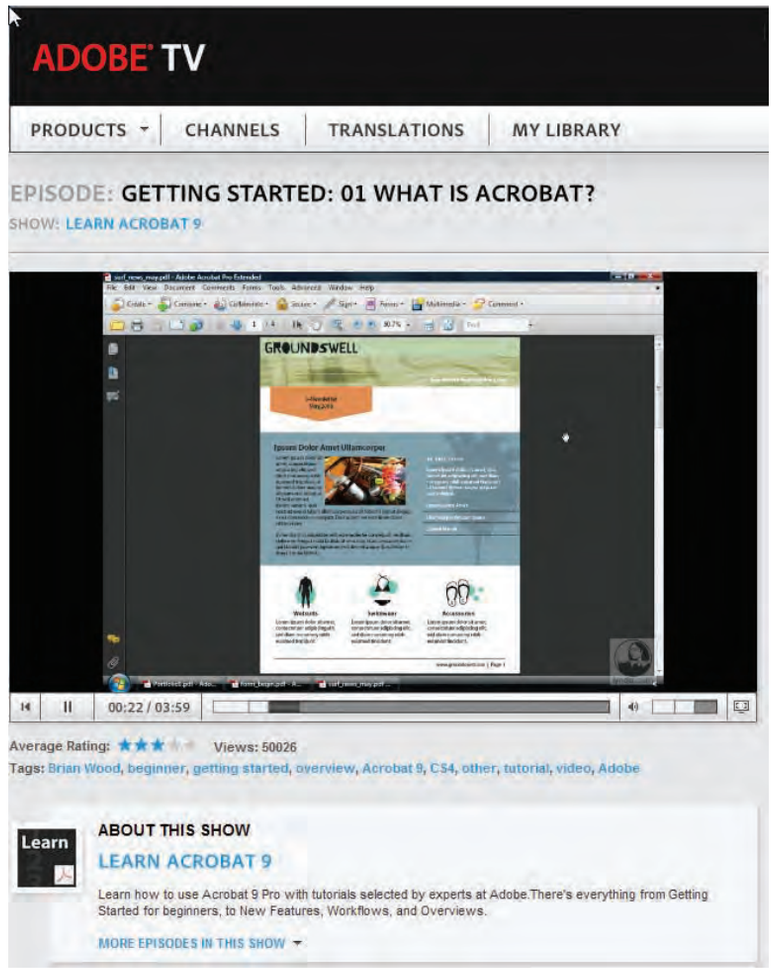
The Ultimate CAD Directory

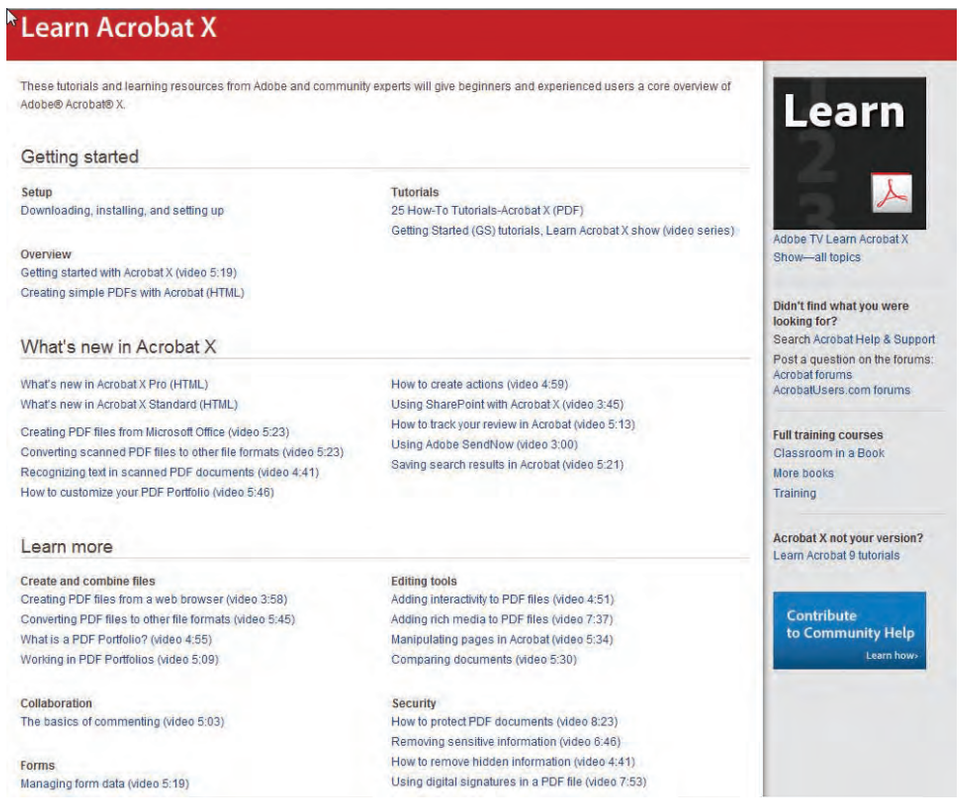
This directory has information about all sorts of CAD products to suit every type of need:

www.tenlinks.com/CAD

Computers have long been used in engineering design. ***Computer-aided design (CAD)* programs are intended for the design of products, structures, civil engineering drawings, and maps.** CAD programs, which are available for microcomputers, help architects design buildings and workspaces and help engineers design cars, planes, electronic devices, roadways, bridges, and subdivisions. CAD and drawing programs are similar. However, CAD programs provide precise dimensioning and positioning of the elements being drawn, so they can be transferred later to computer-aided manufacturing (CAM) programs. Also, CAD programs lack some of the special effects for illustrations that come with drawing programs. One advantage of CAD software is that the product can be drawn in three dimensions and then rotated on the screen, so the designer can see all sides. *(● See Panel 3.36, p. 184.)* Examples of popular CAD programs are Autodesk, AutoCAD, TurboCAD, Alibre Design, and PowerCADD.

Computer-aided design/computer-aided manufacturing (CAD/CAM) software allows products designed with CAD to be input into an automated manufacturing system that makes the products. For example, CAD/CAM systems brought a whirlwind of enhanced creativity and efficiency to the fashion industry. The designs and specifications are then input into CAM systems that enable robot pattern-cutters to automatically cut thousands of patterns from fabric with only minimal waste. Whereas previously the fashion industry worked about a year in advance of delivery, CAD/CAM has cut that time to less than 8 months—a competitive edge for a field that feeds on fads.


ADOBE TV
PRODUCTS
CHANNELS
TRANSLATIONS
MY LIBRARY
EPISODE: GETTING STARTED: 01 WHAT IS ACROBAT?
SHOW: LEARN ACROBAT 9
GROUNDSWELL
00:22 / 03:59
Average Rating:
Views: 50026
Tags: Brian Wood, beginner, getting started, overview, Acrobat 9, CS4, other, tutorial, video, Adobe
Learn
ABOUT THIS SHOW
LEARN ACROBAT 9
Learn how to use Acrobat 9 Pro with tutorials selected by experts at Adobe.There's everything from Getting Started for beginners, to New Features, Workflows, and Overviews.
MORE EPISODES IN THIS SHOW


Learn Acrobat X
These tutorials and learning resources from Adobe and community experts will give beginners and experienced users a core overview of Adobe® Acrobat® X.
Getting started
Setup
Downloading, installing, and setting up
Overview
Getting started with Acrobat X (video 5:19)
Creating simple PDFs with Acrobat (HTML)
Tutorials
25 How-To Tutorials-Acrobat X (PDF)
Getting Started (GS) tutorials, Learn Acrobat X show (video series)
What's new in Acrobat X
What's new in Acrobat X Pro (HTML)
What's new in Acrobat X Standard (HTML)
Creating PDF files from Microsoft Office (video 5:23)
Converting scanned PDF files to other file formats (video 5:23)
Recognizing text in scanned PDF documents (video 4:41)
How to customize your PDF Portfolio (video 5:46)
How to create actions (video 4:59)
Using SharePoint with Acrobat X (video 3:45)
How to track your review in Acrobat (video 5:13)
Using Adobe SendNow (video 3:00)
Saving search results in Acrobat (video 5:21)
Learn more
Create and combine files
Creating PDF files from a web browser (video 3:58)
Converting PDF files to other file formats (video 5:45)
What is a PDF Portfolio? (video 4:55)
Working in PDF Portfolios (video 5:09)
Editing tools
Adding interactivity to PDF files (video 4:51)
Adding rich media to PDF files (video 7:37)
Manipulating pages in Acrobat (video 5:34)
Comparing documents (video 5:30)
Collaboration
The basics of commenting (video 5:03)
Forms
Managing form data (video 5:19)
Security
How to protect PDF documents (video 8:23)
Removing sensitive information (video 6:46)
How to remove hidden information (video 4:41)
Using digital signatures in a PDF file (video 7:53)
Learn
Adobe TV Learn Acrobat X Show—all topics
Didn't find what you were looking for?
Search Acrobat Help & Support
Post a question on the forums:
Acrobat forums
AcrobatUsers.com forums
Full training courses
Classroom in a Book
More books
Training
Acrobat X not your version?
Learn Acrobat 9 tutorials
Contribute to Community Help
Learn how

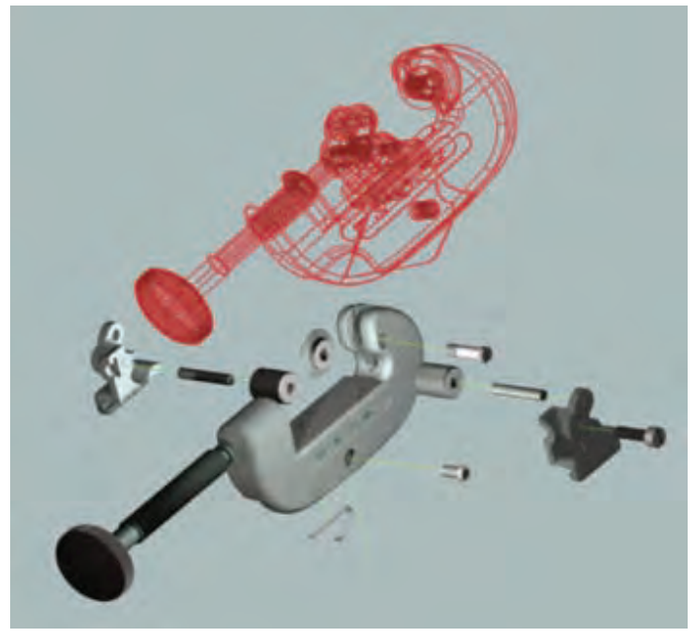
panel 3.35

Adobe Acrobat PDF tutorial screens
(*lower right corner*) Adobe PDF file icon. Any file in the PDF format will have this icon next to the filename.

panel 3.36

CAD

CAD software is used for nearly all three-dimensional designing. (*Top*) TurboCAD; (*bottom*) Autodesk



3.11 Filenames & Extensions

A filename is a name given to a computer file to distinguish it from other computer files. A file extension is the suffix preceded by a dot at the end of a filename that indicates what type of file it is.

An applications file—such as a Word document and an Excel spreadsheet document—is the collection of data or information that is treated as a unit by the computer; as we noted earlier, it is a data file. **Data files are given names—*filenames*.** If you're using a word processing program to write a psychology term paper, you might name it "Psychreport." In a database, a filename might be "AccountingPersonnel."

Filenames also have *extensions,* or *extension names,* usually three or four letters added after a period following the filename. For example, the *.doc* in *Psychreport.doc* is recognized by Microsoft Word as a "document," as is *.docx,* which refers to a Word 2007 or 2010 document. Extensions are usually inserted automatically by the application software.

Survival Tip

Some Records Have to Be Hardcopy

You could scan your birth certificate, will, or car ownership title into your computer to make a digital record. But such records printed off a hard drive aren't always legally acceptable. Original documents are often required by government agencies and the court system.

Three types of data files worth particular attention are graphics, audio, and video files.

- **Graphics files:** Some important ones are *.bmp, .tiff, .gif, .jpeg,* and *.png.*
- **Audio files:** The ones you're most apt to encounter are *.mp3, .wav,* and *.mid.*
- **Animation/video files:** Common files are *.qt, .mpg, .wmv, .avi.,* and *.rm*.

The box on the next page describes these and other common types of files. *(● See Panel 3.37.)*

Data Compression: Putting More Data in Less Space

Data compression methods enable devices to transmit or store the same amount of data in fewer bits.

The vast streams of text, audio, and visual information threaten to overwhelm us. To fit large multimedia files into less space and increase the speed of data transmission, a technique called compression/decompression, or *codec,* is used. ***Compression*** **is a method of removing repetitive elements from a file so that the file requires less storage space and therefore less time to transmit.** Later the data is decompressed—the repeated patterns are restored.

There are two principal methods of compressing data—lossless and lossy. In any situation, which of these two techniques is more appropriate will depend on whether data quality or storage space is more critical.

Lossless compression uses mathematical techniques to replace repetitive patterns of bits with a kind of coded summary. During decompression, the coded summaries are replaced with the original patterns of bits. In this method, the data that comes out is exactly the same as what went in; it has merely been repackaged for purposes of storage or transmission. Lossless techniques are used when it's important that nothing be lost—for instance, for computer data, database records, spreadsheets, and word processing files.

Lossy compression techniques permanently discard some data during compression. Lossy data compression involves a certain loss of accuracy in exchange for a high degree of compression (to as little as 5% of the original file size). This method of compression is often used for graphics files and sound files. Thus, a lossy codec might discard subtle shades of color or sounds outside the range of human hearing. Most users wouldn't notice the absence of these details. Examples of two lossy compression file formats are *.jpeg* and *.mpeg.*

more info!

More Types of Application Software

Gaming software examples:

BioShock Infinite
Batman: Arkham City
NBA 2K12
Insanely Twisted Shadow Planet
Super Mario 3DS

Educational software examples:

SAT
GMAT
LSAT
MCAT
lumosity.com
brainage.com

Simulation program examples:

Flight Simulator X
Physion (physics simulation software)
CCENT 640-822 Network Simulator

Course management software examples:

Learning Management LMS
Blackboard
Moodle

Reference & encyclopedia examples:

Britannia Ultimate Reference Suite
Oxford World Encyclopedia
Reference Point Software (for MLA and APA scholarly writing)

panel 3.37

Common types of files

Graphic files

- *.bmp (BitMap):* Bitmapped graphic format native to Microsoft Windows. Some Macintosh programs can also read .bmp files.
- *.gif (Graphic Interchange Format):* Pronounced "Jiff." Format used on web pages and downloadable images.
- *.jpeg or .jpg (Joint Photographic Experts Group):* Pronounced "*Jay-peg*." Used for web images and for digital photography, especially for high-resolution images.
- *.pcx:* Format introduced for PC Paintbrush. Used for other graphics packages as well.
- *.pict (PICTure):* Format used by Apple for use on Macintosh computers.
- *.png (Portable Network Graphic):* Pronounced "ping." Patent-free alternative to *.gif.*
- *.tiff or .tif (Tagged Image File Format):* High-resolution bitmapped graphics file widely used on both Macintosh and PC computers. Used in exchanging bit-mapped files that will be printed.

Audio files

- *.au:* Low-fidelity monaural format now often used to distribute sample sounds online.
- *.mid (MIDI, Musical Instrument Digital Interface):* Format meant to drive music synthesizers.
- *.mp3 (MPEG-3):* File format used to compress CD-quality music while preserving much of the original sound quality. (Also *.mp4*.)
- *.wav (WAVe):* Waveform file format that contains all the digital information needed to play speaker-quality music.

Video files

- *.avi (Audio Video Interleaved):* Video file format recognized by Windows Media Player. Not good for broadcast-quality video.
- *.mov or .qt (QuickTime):* Video file formats developed by Apple for QuickTime video player. Can play broadcast-quality video.
- *.mpg or .mpeg (Motion Picture Experts Group):* Video formats for full-motion video. MPEG-2 format used by DVD-ROM disks. MPEG-4 recognized by most video player software.
- *.rm (RealMedia):* Popular file format for streaming video.
- *.wmv (Windows Media Video):* Video format recognized by Windows Media Player.

Other files

- *ASCII files:* Text-only files containing no graphics and no formatting such as boldface or italic. ASCII format is used to transfer documents between computers, such as PC and Macintosh. Such files may use the *.txt* (for text) extension.
- *Web files:* Files carried over World Wide Web. Extensions include *.html, .htm, .xml, and .asp* (active server page).
- *Desktop publishing files:* Include PostScript commands, which instruct a PostScript printer how to print a file and use *.eps* (encapsulated PostScript).
- *Drivers:* Software drivers often have the extension *.drv.*
- *Windows operating system files:* Files such as *Autoexec.bat* and *Config.sys* relate to OS setup.
- *PDF (Portable Document Format) files:* Files that use Adobe Acrobat's format for all types of document exchange as well as for publishing documents on the web that are downloaded and read independently of the HTML pages. These files use the extension *.pdf.* Editable PDF files are created with Adobe's Acrobat software. Acrobat can convert a wide variety of document types on Windows, Mac, and Unix to PDF format.

EXPERIENCE BOX

Getting Help from Tech Support

Your screen flashes "Fatal Error." Your new software upgrade totals your printer. You can't connect to your Internet access provider. No wonder one online survey found that nearly 20% of the respondents admitted they'd dropped a computer on the floor out of anger.[5] *Because of the complicated mesh of elements—software, hardware, communications, people—Murphy's Law ("If anything can go wrong, it will") seems to apply in computing as almost nowhere else. Information technology is becoming more complex. The more personal computers and other infotech devices are expected to do—music, video, photos, DVDs, home networking, email, and so on—the more complex the interaction between the components and the harder it is to figure out what's wrong. Also, the proliferation of viruses, worms, spyware, and other types of malware makes the support task more daunting. Thus, one of the most valuable tasks you can learn is how to deal with tech support—getting technical help on the phone or online (via email or websites) when things don't work.* (• *See Panel 3.38 on the next page.*)

Improving Your Chances with Tech Support

Here are three things that you can do in advance to improve your chances of success:

- *Use the web to research a manufacturer's tech support before you buy:* If you decide to purchase or upgrade, go to the manufacturer's website and look at tech support resources to see how coherent and easily accessible they are. This will also give you some feel for the kinds of problems customers are having. Also check out some online comment forums on the item you are planning to buy/upgrade (for example, *www.techsupportforum.com/forums*). Another good idea is to print out some articles on tech help, such as *PC Magazine*'s "Top Tips for Tech Support Success" (*www.pcmag.com/article2/0,2817,2192075,00.asp*), and keep them on hand for when you can't get online for help.
- *Call tech support before you buy:* Calling tech support in advance of purchasing may cost you something in long-distance charges, but you'll also find out how confusing the voice menu is and how long it takes to reach a live human.
- *Create a fact sheet with your computer's important specs:* When you get a computer or new software, create a fact sheet listing the important technical specifications and attach it to the outside of the computer case. This will provide you with the kind of information that tech support personnel will ask should you call them. Take a copy along with you whenever you buy a game or other video- and sound-intensive application to make sure it is compatible with the rest of your system.
- *If you have a communication problem, ask to be referred to another person:* Many companies now hire people in offshore call centers as tech support specialists, and sometimes you may have trouble with unfamiliar accents. If this happens to you, don't give up your place in line; ask to be connected to another service representative.

Other Sources of Help

Although usually less specific in solving your problem, other sources of help are available:

- *Help programs: instruction manuals, software, and online:* User guides or instruction manuals printed on paper have traditionally accompanied software. Now most software publishers rely more on Help programs on a CD/DVD or in downloadable PDF manuals. Help programs are also available through the Internet. The problem with this approach, of course, is—How do you go online to solve the problem of your computer not working if your computer isn't working? (It helps to have two computers.)
- *Commercial how-to books:* How-to books are the kind of books found both in computer stores and in general bookstores such as Barnes & Noble and on Amazon.com. Examples are the "For Dummies" or "Complete Idiot's" books (such as *PCs for Dummies* and *The Complete Idiot's Guide to Microsoft Office*).
- *Knowledgeable friends:* Nothing beats having a knowledgeable friend: your instructor, a student more advanced than you, or someone with a technical interest in computers. We can't stress enough how important it is to get to know people—from your classes, from computer user groups (including online Internet groups), from family friends, or whatever—who can lend aid and expertise when your computer software or hardware gives you trouble.

Company	Price	Services
Ask Dr. Tech 1-888-592-8843 *www.AskDrTech.com*	$98 per year, $39 per month, $24 per call	Phone, email, or online chat support for PCs and Macs and peripherals
geeks to go! Toll free: 888-433-5435 *www.geekstogo.com/*	Free	Live chat support with consultants and forums for numerous software and hardware problems
Geek Squad 1-800-433-5778 *www.geeksquad.com*	From $29 to about $300, depending on the problem; at your location, one of their stores, or at a Best Buy store	Almost any problem related to computers, electronics, and networks
Geeks on Call 1-800-905-GEEK *www.geeksoncall.com*	Varies, depending on the problem	Same as above
Nerds On Site 1-877-696-3737 *www.nerdsonsite.us*	Same as above	Same as above
iYogi 1-877-570-2965 *www.iyogi.com*	$169 per year	24/7 PC and peripherals support
Just Answer *www.justanswer.com/Geek*	Name your price and place a deposit Free online chat, email, text message	PCs and Macs
itok 1-866-515-itok *www.itokhelp.com*	$40 per incident and up, or $20 per month (gold membership) or $35 per month (platinum membership)	PCs, Macs, and peripherals
firedog 1-877-505-3714 *www.firedog.com*	$25–$50 per month, depending on the number of computers	All kinds of support

panel 3.38

Some individual technical support services
800 and 888 numbers are toll-free. Most services are available 24 hours a day, 7 days a week. Note that not all operations serve Macintosh users, and not all have a phone option—which can be a handicap when you're not able to go online.

KEY TERMS & EXPLANATIONS

analytical graphics (p. 164) Also called *business graphics;* graphical forms that make numeric data easier to analyze than it is when organized as rows and columns of numbers. The principal examples of analytical graphics are bar charts, line graphs, and pie charts. Why it's important: *Whether viewed on a monitor or printed out, analytical graphics help make sales figures, economic trends, and the like easier to comprehend and analyze.*

animation (p. 177) The simulation (illusion) of movement created by displaying a series of still pictures, or frames, very quickly in sequence. Why it's important: *Animation is used in video games, movies, special-effects presentations, and even in email, to make it more interesting.*

application software (p. 121) Software that has been developed to solve a particular problem for users—to perform useful work on specific tasks or to provide entertainment. Why it's important: *Application software consists of most of the software you are familiar with and use on a daily basis.* (Compare ***system software.***)

booting (p. 122) Loading an operating system into a computer's main memory. Why it's important: *Without booting, computers could not operate. The programs responsible for booting are stored permanently in the computer's electronic circuitry. When you turn on the machine, programs called* diagnostic routines *test the main memory, the central processing unit, and other parts of the system to make sure they are running properly. Next, BIOS (basic input/output system) programs are copied to main memory and help the computer interpret keyboard characters or transmit characters to the display screen or to a diskette. Then the boot program obtains the operating system, usually from the hard disk, and loads it into the computer's main memory, where it remains until you turn the computer off.*

cell (p. 163) Place where a row and a column intersect in a spreadsheet worksheet; its position is called a *cell reference or a cell address.* Why it's important: *The cell is the smallest working unit in a spreadsheet. Data and formulas are entered into cells. Cell addresses provide location references for worksheet users.*

compression (p. 185) Method of removing repetitive elements from a file so that the file requires less storage space, then later decompressing the removed data, or restoring the repeated patterns. Why it's important: *Compression/decompression makes storage and transmission of large files, such as multimedia files, more feasible.*

computer-aided design (CAD) (p. 182) Programs intended for the design of products, structures, civil engineering drawings, and maps. Why it's important: *CAD programs, which are available for microcomputers, help architects design buildings and workspaces and help engineers design cars, planes, electronic devices, roadways, bridges, and subdivisions. While similar to drawing programs, CAD programs provide precise dimensioning and positioning of the elements being drawn, so they can be transferred later to computer-aided manufacturing programs; however, they lack special effects for illustrations. One advantage of CAD software is that three-dimensional drawings can be rotated on-screen, so the designer can see all sides of the product.*

cursor (p. 156) Movable symbol on the display screen that shows where the user may next enter data or commands. The symbol is often a blinking rectangle or an I-beam. You can move the cursor on the screen using the keyboard's directional arrow keys or a mouse. The point where the cursor is located is called the *insertion point.* Why it's important: *All application software packages use cursors to show the current work location on the screen.*

data files (p. 153) Files that contain data—words, numbers, pictures, sounds, and so on. Why it's important: *Unlike program files, data files don't instruct the computer to do anything. Rather, data files are there to be acted on by program files. Examples of common extensions in data files are* .txt *(text) and* .xls *(spreadsheets). Certain proprietary software programs have their own extensions, such as .html for Hypertext Markup Language,* .ppt *for PowerPoint, and* .mdb *for Access. (Extensions are three or more letters.)*

database (p. 165) Collection of interrelated files in a computer system. These computer-based files are organized according to their common elements, so that they can be retrieved easily. Why it's important: *Businesses and organizations build databases to help them keep track of and manage their affairs. In addition, online database services put enormous resources at the user's disposal.*

database software (p. 166) Also called *database manager* or *database management system (DBMS);* application software that sets up and controls the structure of a database and access to the data. Why it's important: *Database software allows users to organize and manage huge amounts of data.*

default settings (p. 160) Settings automatically used by a program unless the user specifies otherwise, thereby overriding them. Why it's important: *Users need to know how to change default settings in order to customize documents.*

desktop (p. 133) The operating system's main interface screen. Why it's important: *The desktop displays pictures (icons) that provide quick access to programs and information.*

desktop publishing (DTP) (p. 173) Application software and hardware system that involves mixing text and graphics to produce high-quality output for commercial printing, using a microcomputer and mouse, scanner, digital cameras, laser or ink-jet printer, and DTP software (such as QuarkXPress and InDesign or, at a more consumer-oriented level, Microsoft Publisher). Often the printer is used primarily to get an advance look before the completed job is sent to a typesetter for even higher-quality output. Some word processing programs, such as Word and WordPerfect, have rudimentary DTP features. Why it's important: *Desktop publishing has reduced the number of steps, the time, and the money required to produce professional-looking printed projects.*

device drivers (p. 127) Specialized software programs—usually components of system software—that allow input and output devices to communicate with the rest of the computer system. Why it's important: *Drivers are needed so that the computer's operating system can recognize and run peripheral hardware.*

embedded system (p. 148) Operating system for any electronic system that uses a CPU chip but that is not a general-purpose workstation, desktop, or laptop computer. It is a specialized computer system that is part of a larger system or a machine. Why it's important: *Embedded systems are used, for example, in automobiles, planes, trains, barcode scanners, fuel pumps, space vehicles, machine tools, watches, appliances, cellphones, and robots. Handheld computers and personal digital assistants also rely on specialized operating systems. Such operating systems include Android, Symbian, iPhone, Windows Phone, BlackBerry OS, Embedded Linux, and many others.*

exporting (p. 153) Transforming data into a format that can be used in another program and then transmitting it. Why it's important: *Users need to know how to export many types of files.*

file (p. 124) A named collection of data (data file) or a program (program file) that exists in a computer's secondary storage, such as on a hard disk or CD. Why it's important: *Dealing with files is an inescapable part of working with computers. Users need to be familiar with the different types of files.*

filename (p. 184) The name given to a file. Why it's important: *Files are given names so that they can be differentiated. Filenames also have extension names of three or four letters added after a period following the filename.*

financial software (p. 172) Application software that ranges from personal-finance managers to entry-level accounting programs to business financial-management packages. Why it's important: *Financial software provides users with powerful management tools (personal-finance managers) as well as small business programs. Moreover, tax programs provide virtually all the forms needed for filing income taxes, make complex calculations, check for mistakes, and even unearth deductions you didn't know existed. Tax programs can also be integrated with personal finance software to form an integrated tool. Accounting software automates bookkeeping tasks, while payroll software keeps records of employee hours and produces reports for tax purposes. Some programs allow users to set up a business from scratch. Financial software also includes investment software packages and various retirement planning programs.*

formulas (p. 163) In a spreadsheet, instructions for calculations entered into designated cells. Why it's important: *When spreadsheet users change data in one cell, all the cells linked to it by formulas automatically recalculate their values.*

freeware (p. 151) Copyrighted software that is distributed free of charge, today most often over the Internet. Why it's important: *Freeware saves users money.*

function keys (p. 131) Keys labeled "F1," "F2," and so on, positioned along the top of the keyboard. Why it's important: *They are used to execute commands specific to the software being used.*

functions (p. 163) In a spreadsheet, built-in formulas that perform common calculations. Why it's important: *After the values have been entered into the worksheet, formulas and functions can be used to calculate outcomes.*

graphical user interface (GUI) (p. 133) User interface in which icons and commands from menus may be selected by means of a mouse or keystrokes. Why it's important: *GUIs are easier to use than command-driven interfaces.*

Help command (p. 138) Command generating a table of contents, an index, and a search feature that can help users locate answers to questions about the software. Why it's important: *Help features provide a built-in electronic instruction manual.*

icons (p. 133) Small pictorial figures that represent programs, data files, or procedures. Why it's important: *Icons have simplified the use of software. The feature represented by the icon can be activated by clicking on the icon.*

importing (p. 153) Getting data from another source and then converting it into a format compatible with the program in which the user is currently working. Why it's important: *Users will often have to import files.*

key (p. 166) Also called *key field, primary key*, *sort key, index,* or *keyword;* field used to sort data in a database. For example, if users sort records by age, then the age field is a key. Why it's important: *Key fields are needed to identify and retrieve specific items in a database. Most database management systems allow you to have more than one key so that you can sort records in different ways. One of the keys is designated the primary key and must hold a unique value for each record. A key field that identifies records in different tables and relates them to the primary key is called a foreign key. Foreign keys are used to cross-reference data among relational tables. The most frequent key field used in the United States is the Social Security number, but any unique identifier, such as employee number or student number, can be used.*

Linux (p. 146) Free (open-source) version of the Unix OS, supported by the efforts of thousands of volunteer programmers. Why it's important: *Linux is an inexpensive, open-source operating system useful for online applications and to PC users who have to maintain a web server or a network server.*

Macintosh operating system (Mac OS) (p. 140) System software that runs only on Apple Macintosh computers. Why it's important: *Although Macs are not as common as PCs, many people believe they are easier to use. Macs are often used for graphics and desktop publishing.*

macro (p. 132) Also called *keyboard shortcut;* a single keystroke or command—or a series of keystrokes or commands—used to automatically issue a longer, predetermined series of keystrokes or commands. Why it's important: *Users can consolidate several activities into only one or two keystrokes. The user names the macro and stores the corresponding command sequence; once this is done, the macro can be used repeatedly.*

menu (p. 133) Displayed list of options—such as commands—to choose from. Why it's important: *Menus are a feature of GUIs that make software easier to use.*

menu bar (p. 135) Bar across the top of the display window, below the title bar. Why it's important: *It shows the names of the various pull-down menus available.*

Microsoft Windows (p. 142) Most common operating system for desktop and portable microcomputers. Windows 95 was succeeded by Windows 98, Windows 2003, Windows Me, Windows XP, Vista, Windows 7, and Windows 8. Why it's important: *Windows supports the most applications written for microcomputers.*

Microsoft Windows Server (p. 145) Microsoft's multitasking OS designed to run on network servers in businesses of all sizes. Why it's important: *It allows multiple users to share resources such as data, programs, and printers and to build web applications and connect to the Internet.*

multimedia authoring software (p. 178) Application software that combines text, graphics, video, animation, and sound in an integrated way to create stand-alone multimedia applications. Why it's important: *Multimedia is now commonplace and an important feature of the web and many software application, including those for mobile devices.*

multitasking (p. 125) Feature of OS software that allows the execution of two or more programs concurrently by one user almost at the same time on the same computer with one or two CPUs. For instance, you might write a report on your computer with one program while another plays a music CD. Why it's important: *Multitasking allows the computer to switch rapidly back and forth among different tasks. The user is generally unaware of the switching process and thus can work in more than one application at a time.*

open-source software (p. 146) Software that any programmer can download from the Internet free and modify with suggested improvements. The only qualification is that changes can't be copyrighted; they must be made available to all and remain in the public domain. Why it's important: *Because this software is not proprietary, any programmer can make improvements, which can result in better-quality software.*

operating system (OS) (p. 121) Low-level master system of programs that manage the basic operations of the computer. Why it's important: *These programs provide resource management services of many kinds. In particular, they handle the control and use of hardware resources, including disk space, memory, CPU time allocation, and peripheral devices. The operating system allows users to concentrate on their own tasks or applications rather than on the complexities of managing the computer.*

PDF *See* **portable document format.**

personal-finance manager (p. 172) Application software that lets users keep track of income and expenses, write checks, do online banking, and plan financial goals. Why it's important: *Personal-finance software can help people manage their money more effectively.*

personal information manager (PIM) (p. 168) Software that helps users keep track of and manage information they use on a daily basis, such as addresses, telephone numbers, appointments, to-do lists, and miscellaneous notes. Some programs feature phone dialers, outliners (for roughing out ideas in outline form), and ticklers (or reminders). Why it's important: *PIMs can help users better organize and manage daily business activities.*

pirated software (p. 151) Software that is obtained illegally. Why it's important: *If you buy such software, not only do the original copyright owners not get paid for their creative work but you risk getting inferior goods and, worse, picking up a virus. To discourage software piracy, many software manufacturers require that users register their software when they install it on their computers. If the software is not registered, it will not work properly.*

platform (p. 138) Particular processor model and operating system on which a computer system is based. Why it's important: *Generally, software written for one platform will not run on any other. Users should be aware that there are Mac platforms (Apple Macintosh) and Windows platforms, or "PC platforms" (for personal computers such as Dell, Acer, Inovo, Toshiba, Hewlett-Packard, and others that run Microsoft Windows).*

pointer (p. 132) Indicator that usually appears as an arrow, although it changes shape depending on the application. The mouse is used to move the pointer to a particular place on the display screen or to point to little symbols, or icons. Why it's important: *Manipulating the pointer on the screen by means of the mouse is often easier than typing commands on a keyboard.*

portable document format (PDF) (p. 182) File format developed by Adobe Systems. PDF captures text, graphic, and formatting information from a variety of applications on different platforms making it possible to send documents and have them appear on the recipient's monitor (or printer) as they were intended to be viewed. Why it's important: *A properly prepared PDF file maintains the original fonts (type styles and type sizes), images, colors, and graphics, as well as the exact layout of the file. A PDF file can be shared, viewed, and printed by anyone using the free downloadable Adobe Reader software. PDF can also be used on mobile devices. With the complete Adobe Acrobat suite, users can also edit PDF files.*

presentation graphics software (p. 169) Software that uses graphics, animation, sound, and data or information to make visual presentations. Why it's important: *Presentation graphics software provides a means of producing sophisticated graphics.*

productivity software (p. 154) Application software such as word processing programs, spreadsheets, and database managers. Why it's important: *Productivity software makes users more productive at particular tasks.*

program files (p. 152) Files containing software instructions. Why it's important: *Contrast* ***data files.***

project management software (p. 180) Program used to plan and schedule the people, costs, and resources required to complete a project on time. Why it's important: *Project management software increases the ease and speed of planning and managing complex projects.*

public-domain software (p. 150) Software, often available on the Internet, that is not protected by copyright and thus may be duplicated by anyone at will. Why it's important: *Public-domain software offers lots of software options to users who may not be able to afford much commercial software. Users may download such software from the Internet free and make as many copies as they wish.*

range (p. 163) A group of adjacent cells in a spreadsheet—for example, A1 to A5. Why it's important: *Ranges help sort data for calculation or reports.*

recalculation (p. 163) The process of recomputing values in a spreadsheet, either as an ongoing process as data is entered or afterward, with the press of a key. Why it's important: *With this simple feature, the hours of mind-numbing work required to manually rework paper spreadsheets have become a thing of the past.*

relational database (p. 166) Database in which data is organized into related tables. Each table contains rows and columns; the rows are called *records,* and the columns are called *fields.* An example of a record is a person's address—name, street address, city, and so on.

An example of a field is that person's last name; another field would be that person's first name; a third field would be that person's street address; and so on. Why it's important: *The relational database is the most common type of database.*

rentalware (p. 151) Software that users lease for a fee and download whenever they want it. Why it's important: *This is the concept behind application service providers (ASPs).*

rollover (p. 133) Icon feature, also called a tooltip, in which a small textbox explaining the icon's function appears when you roll the mouse pointer over the icon. A rollover may also produce an animated graphic. Why it's important: *The rollover gives the user an immediate explanation of an icon's meaning.*

saving (p. 161) Storing, or preserving, a document as an electronic file permanently—on hard disk, flash drive, CD, or online (in the cloud) for example. Why it's important: *Saving is a feature of nearly all application software. Having the document stored in electronic form spares users the tiresome chore of retyping it from scratch whenever they want to make changes. Users need only retrieve it from the storage medium and make the changes, then resave it and print it out again.*

scrolling (p. 156) Moving quickly upward, downward, or sideways through the text or other screen display. Why it's important: *A standard computer screen displays only 20–22 lines of standard-size text; however, most documents are longer than that. Using the directional arrow keys, or the mouse and a scroll bar located at the side of the screen, users can move ("scroll") through the display screen and into the text above and below it.*

shareware (p. 151) Copyrighted software that is distributed free of charge but requires that users make a monetary contribution in order to continue using it. Shareware is distributed primarily through the Internet. Because it is copyrighted, you cannot use it to develop your own program that would compete with the original product. Why it's important: *Like public-domain software and freeware, shareware offers an inexpensive way to obtain new software.*

software license (p. 150) Contract by which users agree not to make copies of software to give away or resell. Why it's important: *Software manufacturers don't sell people software; they sell them licenses to become authorized users of the software.*

special-purpose keys (p. 131) Keys used to enter, delete, and edit data and to execute commands. For example, the *Esc* (for "Escape") key tells the computer to cancel an operation or leave ("escape from") the current mode of operation. The Enter, or Return, key tells the computer to execute certain commands and to start new paragraphs in a document. Why it's important: *Special-purpose keys are essential to the use of software.*

spreadsheet program (p. 161) Application software that allows users to create tables and financial schedules by entering data and formulas into rows and columns arranged as a grid on a worksheet display screen. A spreadsheet file is called a workbook. Why it's important: *When data is changed in one cell, values in other cells in the linked worksheets are automatically recalculated.*

supervisor (p. 123) Also called *kernel;* the central component of the operating system that manages the CPU. Why it's important: *The supervisor remains in main memory while the computer is running. As well as managing the CPU, it copies other nonresident programs into memory to perform tasks that support application programs.*

system software (p. 121) The software that helps the computer perform essential operating tasks and enables the application software to run. The most important component of system software is the *operating system*, the master control program that runs the computer. Examples of operating system software for the PC are various Microsoft programs (such as Windows XP, Vista, and 7), Apple Macintosh OS X, Unix, and Linux. Why it's important: *Computers cannot run application software without having system software.*

taskbar (p. 135) Graphic toolbar that appears at the bottom of the Windows screen. Why it's important: *The taskbar presents the applications that are running.*

template (p. 158) In word processing, a preformatted document that provides basic tools for shaping a final document—the text, layout, and style for a letter, for example. Why it's important: *Templates make it very easy for users to prepare professional-looking documents, because most of the preparatory formatting is done.*

title bar (p. 135) Bar across the very top of the display window. Why it's important: *It shows the name of the folder the user is in.*

toolbar (p. 135) Bar across the top of the display window, below the menu bar. It displays menus and icons representing frequently used options or commands. Why it's important: *Toolbars make it easier to identify and execute commands.*

Unix (p. 145) Proprietary multitasking operating system for multiple users that has built-in networking capability and versions that can run on all kinds of computers. Why it's important: *Government agencies, universities, research institutions, large corporations, and banks all use Unix for everything from designing airplane parts to currency trading. Unix is also used for website management. The developers of the Internet built their communication system around Unix because it has the ability to keep large systems (with hundreds of processors) churning out transactions day in and day out for years without fail.*

user interface (p. 131) User-controllable graphic display screen that allows the user to communicate, or interact, with his or her computer. Why it's important: *The interface determines the ease of use of hardware and software. The three types of user interface are command-driven, menu-driven, and graphical (GUI), which is now the most common. Without user interfaces, no one could operate a computer system.*

utility programs (p. 130) Also known as *service programs;* system software components that perform tasks related to the control, allocation, and maintenance of computer resources. Why it's important: *Utility programs enhance existing functions or provide services not supplied by other system software programs. Most computers come with built-in utilities as part of the system software; they usually include backup, data recovery, virus protection, data compression, and file defragmentation, along with check (scan) disk and disk cleanup.*

value (p. 163) A number or date entered in a spreadsheet cell. Why it's important: *Values are the actual numbers used in the spreadsheet—dollars, percentages, grade points, temperatures, or whatever.*

web page design/authoring software (p. 179) Software used to create web pages with sophisticated multimedia features. Why

it's important: *Allows beginners as well as professional web designers to create web pages, which have become extremely important communications tools on the Internet, for all sorts of purposes.*

what-if analysis (p. 164) Spreadsheet feature that employs the recalculation feature to investigate how changing one or more numbers changes the outcome of the calculation. Why it's important: *Users can create a worksheet, putting in formulas and numbers, and then ask, "What would happen if we change that detail?"—and immediately see the effect.*

window (p. 135) Rectangular frame on the computer display screen. Through this frame users can view a file of data—such as a document, spreadsheet, or database—or an application program. Why it's important: *Using windows, users can display at the same time portions of several documents and/or programs on the screen.*

word processing software (p. 156) Application software that allows users to use computers to format, create, edit, print, and store text material, among other things. Why it's important: *Word processing software allows users to maneuver through a document and delete, insert, and replace text, the principal correction activities. It also offers such additional features as creating, editing, formatting, printing, and saving.*

word wrap (p. 156) Special feature that automatically continues text to the next line by "wrapping around" when the user reaches the right margin. Why it's important: *You don't have to hit a "carriage-return" key or Enter key to move to the next line.*

worksheet (p. 162) See **spreadsheet program.**

CHAPTER REVIEW

1 LEARNING MEMORIZATION

"I can recognize and recall information."

Self-Test Questions

1. _____ software enables the computer to perform essential operating tasks.
2. _____ _____ is the term for programs designed to perform specific tasks for the user.
3. _____ is the activity in which a computer works on more than one process at a time.
4. _____ is the scattering of portions of files about the disk in nonadjacent areas, thus greatly slowing access to the files.
5. Windows and Mac OS are generally used on _____ computers.
6. _____ is the process of loading an operating system into a computer's main memory.
7. A(n) _____ is a utility that will find all the scattered files on your hard disk and reorganize them as contiguous files.
8. The _____ is the component of system software that comprises the master system of programs that manage the basic operations of the computer.
9. The _____ is the user-controllable display screen that allows you to communicate, or interact, with your computer.
10. Disk scanner and disk cleanup utilities detect and correct certain types of common problems on hard disks, such as removing unnecessary files called _____ files that are created by Windows only for short tasks and system restore after system problems.
11. OSs allow users to control access to their computers via use of a(n) _____ and a(n) _____.
12. Software or hardware that is _____ means that it is privately owned and controlled by a company.
13. Linux is _____-_____ software—meaning any programmer can download it from the Internet for free and modify it with suggested improvements.
14. When you power up a computer by turning on the power "on" switch, this is called a _____ boot. If your computer is already on and you restart it, this is called a _____ boot.
15. _____ software allows you to create and edit documents.
16. _____ is the activity of moving upward or downward through the text or other screen display.
17. Name four editing features offered by word processing programs: _____, _____, _____, _____.
18. In a spreadsheet, the place where a row and a column intersect is called a(n) _____.
19. The _____ is the movable symbol on the display screen that shows you where you may next enter data or commands.
20. When you buy software, you pay for a _____, a contract by which you agree not to make copies of the software to give away or resell.
21. Records in a database are sorted according to a(n) _____.
22. _____ involves mixing text and graphics to produce high-quality output for commercial printing.
23. A(n) _____ allows users to create tables and do "what-if" financial analyses by entering data and formulas into rows and columns arranged as a grid on a display screen.
24. _____ automatically continues text to the next line when you reach the right margin.

25. Settings that are automatically used by a program unless the user specifies otherwise are called _____.

26. _____-_____ software is not protected by copyright and may be copied by anyone.

27. _____ _____ are specialized software programs that allow input and output devices to communicate with the rest of the computer system.

28. The _____ format allows documents to be sent to almost any platform and be opened without losing any of their characteristics (text, colors, graphics, formatting).

29. _____ files contain software instructions; _____ files contain words, numbers, pictures, sounds, and so on.

Multiple-Choice Questions

1. Which of the following are functions of the operating system?
   a. file management
   b. CPU management
   c. task management
   d. booting
   e. all of these
2. Which of the following was the first major microcomputer OS?
   a. Mac OS
   b. Windows
   c. DOS
   d. Unix
   e. Linux
3. Which of the following is a prominent network operating system?
   a. Linux
   b. Ubuntu
   c. OES
   d. DOS
   e. Mac OS
4. Which of the following is the newest Microsoft Windows operating system?
   a. Windows Vista
   b. Windows XP
   c. Windows 7
   d. Windows NT
   e. Windows CE
5. Which of the following refers to the execution of two or more programs by one user almost at the same time on the same computer with one central processor?
   a. multitasking
   b. multiprocessing
   c. time-sharing
   d. multiprogramming
   e. coprocessing
6. Which of the following are specialized software programs that allow input and output devices to communicate with the rest of the computer system?
   a. multitasking
   b. boot-disks
   c. utility programs
   d. device drivers
   e. service packs
7. Which of the following is *not* an advantage of using database software?
   a. integrated data
   b. improved data integrity
   c. lack of structure
   d. elimination of data redundancy
8. Which of the following is *not* a feature of word processing software?
   a. spelling checker
   b. cell address
   c. formatting
   d. cut and paste
   e. find and replace
9. What is the common consumer computer interface used today?
   a. command-driven interface
   b. graphical user interface
   c. menu-driven interface
   d. electronic user interface
   e. biometric user interface
10. Which type of software can you download and duplicate without any restrictions whatsoever and without fear of legal prosecution?
    a. commercial software
    b. shareware
    c. public-domain software
    d. pirated software
    e. rentalware
11. Which of these is not a common file extension?
    a. .doc
    b. .nos
    c. .docx
    d. .xls
    e. .jpeg

True/False Questions

T F 1. The supervisor manages the CPU.

T F 2. The first graphical user interface was provided by Microsoft Windows.

T F 3. All operating systems are mutually compatible.

T F 4. *Font* refers to a preformatted document that provides basic tools for shaping the final document.

T F 5. Unix crashes often and thus is not normally used for running important large systems.

T F 6. Windows NT is the most recent Microsoft OS.

T F 7. Spreadsheet software enables you to perform what-if calculations.

T F 8. Public-domain software is protected by copyright and so is offered for sale by license only.

T F 9. The records within the various tables in a database are linked by a key field.

T F 10. QuarkXPress and Adobe InDesign are professional desktop-publishing programs.

T F 11. The best-known graphical user interface is the command-driven one.

T F 12. Microsoft PowerPoint is an example of financial software.

T F 13. Drawing programs create vector images, and painting programs produce bit-mapped images.

T F 14. General computer users can design their own web pages using Adobe Dreamweaver, Adobe Flash, and Microsoft FrontPage.

T F 15. Data files are identified by filenames.

2 LEARNING COMPREHENSION

"I can recall information in my own terms and explain it to a friend."

Short-Answer Questions

1. Briefly define *booting.*
2. What is the difference between a command-driven interface and a graphical user interface (GUI)?
3. Why can't you run your computer without system software?
4. Why is multitasking useful?
5. What is a device driver?
6. What is a utility program?
7. What is a platform?
8. What are the three components of system software? What is the basic function of each?
9. What is open-source software?
10. What does defragmenting do?
11. What is an embedded system?
12. What are the following types of application software used for?
    a. project management software
    b. desktop-publishing software
    c. database software
    d. spreadsheet software
    e. word processing software
13. Which program is more sophisticated, analytical graphics or presentation graphics? Why?
14. How are the following different from one another? Pop-up menu; pull-down menu; cascading menu.
15. What is importing? Exporting?
16. Briefly compare drawing programs and painting programs.
17. Explain what computer-aided design (CAD) programs do.
18. Discuss the various software licenses: site licenses, concurrent-use licenses, multiple-user licenses, single-user license.

3 LEARNING APPLYING, ANALYZING, SYNTHESIZING, EVALUATING

"I can apply what I've learned, relate these ideas to other concepts, build on other knowledge, and use all these thinking skills to form a judgment."

Knowledge in Action

1. Here's a Windows 7 exercise in defragmenting your hard-disk drive. Defragmenting is a housekeeping procedure that will speed up your system and often free up hard-disk space.

   Click on the Start button at the bottom left corner of your screen. Click on All Programs, then Accessories, then System Tools, Disk Defragmenter. Click on the Analyze Disk button to find out how much of your hard disk is fragmented, and click on Defragment Disk to run the defragmentation utility.

   Many times when your PC isn't performing well, such as when it's sluggish, running both ScanDisk and Defragment will solve the problem.
2. Ray Kurzweil is, among other things, the author of *The Age of Intelligent Machines; The Age of Spiritual Machines, When Computers Exceed Human Intelligence;* and *The Singularity Is Near: When Humans Transcend Biology*. He has said: "We are entering a new era. I call it 'the Singularity.' It's a merger between human intelligence and machine intelligence that is going to create something bigger than itself. It's the cutting edge of evolution on our planet" (*www.edge.org/3rd_culture/kurzweil_singularity/kurzweil_singularity_index.html;* accessed July 1, 2009). He envisions a future in which information technologies have advanced so far that they enable humans to transcend their biological limitations (*www.singularity.com*).

   What is "singularity"? Will it hurt? Will we hate it? Will we be able to notice it? Search the terms "Kurzweil" and "Singularity" on *www.singularity.com, www.kurzweilai.net,* and other sites, and see if you can explain the concept to friends within 5 minutes or so.
3. What do you think is the future of Linux? Experts currently disagree about whether Linux will become a serious competitor to Windows. Research Linux on the web. Which companies are creating application software to run on Linux? Which businesses are adopting Linux as an OS? What are the predictions about Linux use?
4. How do you think you will obtain software for your computer in the future? Explain your answer.
5. Design your own handheld. Draw what your ideal handheld would look like, and draw screens of what your user interface would look like. Describe the key features of your handheld.

6. What sorts of tasks do operating systems *not* do that you would like them to do?
7. If you were in the market for a new microcomputer today, what application software would you want to use on it? Why? What are some "dream" applications that you would like that have not yet been developed?
8. Several websites include libraries of shareware programs. Visit the *www.5star-shareware.com* site and identify three shareware programs that interest you. State the name of each program, the operating system it runs on, and its capabilities. Also, describe the contribution you must make to receive technical support. What about freeware? Check out *www.freewarehome.com*.
9. What is your opinion of downloading free music from the web to play on your own computer and/or CDs? Much attention has been given lately to music downloading and copyright infringement. Research this topic in library magazines and newspapers or on the Internet, and take a position in a short report.
10. How do you think you could use desktop publishing at home? For personal items? Family occasions? Holidays? What else? What hardware and software would you have to buy?
11. Think of three new ways that software companies could prevent people from pirating their software.
12. What is your favorite application software program of all? Why?
13. Did your computer come with a Windows Startup disk, and have you misplaced it? If your computer crashes, you'll need this disk to reinstall the operating system.

    To learn the benefits of having a Startup disk, visit *www.microsoft.com.* Type *startup* in the "search for" box; then click on the links that interest you.

Web Exercises

1. Go to *http://list.driverguide.com/list/company243/* and identify the drivers that correspond to equipment you use. How does this website let you know which devices the drivers are for and which operating systems are compatible with them? If you own your own computer, go to the manufacturer's website and locate its resource for updating drivers. Does the manufacturer recommend any driver updates that you could use?
2. Use a web search tool such as Google or Yahoo! to find some online antivirus sites—sites where users can regularly download updates for their antivirus software. Do you know what kind of antivirus software is installed on your computer?
3. Microsoft offers "patches," or updates, for its Windows OS. Go to *www.microsoft.com* and search for the list of updates. What kinds of problems do these updates fix? Do you need any?
4. The History of Operating Systems: Visit the following websites to get an overview of the evolution and history of the theory and function of operating systems:

   www.microsoft.com/windows/winhistoryintro.mspx

   www.computinghistorymuseum.org/teaching/papers/research/history_of_operating_system_Moumina.pdf

   www.osdata.com/kind/history.htm

   www.answers.com/topic/history-of-operating-systems
5. Some people are fascinated by the error message commonly referred to as the "Blue Screen of Death" (BSOD) or "Doom." Run a search on the Internet and find websites that sell T-shirts with the BSOD image on it, photo galleries of public terminals displaying the BSOD, fictional stories of BSOD attacks, and various other forms of entertainment based on the infamous error message.

   Do a search on the web to find users' hypotheses of why the BSOD occurs, and find methods to avoid it. Here are a few sites:

   www.maximumpc.com/article/features/blue_screen_survival_guide

   http://bluescreenofdeathfixer.com/

   http://bsod.org/

   http://bbspot.com/News/2000/9/bsod_death.html

   http://technet.microsoft.com/en-us/library/cc750081.aspx
6. Using Microsoft Excel or another spreadsheet program, make a food shopping list incorporating the estimated price for each item, and then have Excel calculate the overall cost. Then go buy your groceries and compare Excel's price with the supermarket's price. What else could Excel help you with?
7. The Windows operating system comes with a basic word processing program called *WordPad.* Go to the Microsoft home page and to *http://en.wikipedia.org/wiki/WordPad* and find out how WordPad differs from Microsoft Word. Then use a keyword search in a search engine to get more information about these programs. Which one is right for you?
8. Curriculum Data Wales (CDW) is a public/private partnership that has been charged by the Welsh Assembly Government with the task of designing, building, and maintaining the National Grid for Learning Cymru as a bilingual service to schools and colleges in Wales. CDW's website includes some short tutorials on desktop-publishing (DTP), spreadsheet, word processing, and database management software:

   www.ngfl-cymru.org.uk/vtc-home/vtc-ks4-home/vtc-ks4-ict/vtc-ks4-ict-application_software.htm

   Work through the tutorials. Did they expand your knowledge of these applications?

   Do a search for *"application software" & tutorials*. What other useful tutorials did you find?